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Specific Antibody Milk Trials in Calves

Alvin D. Lebeck, D.V.M., Guttenberg, Iowa
Robert A. and James S. Collins, Waukon, Iowa

Robert and James Collins of Waukon, Iowa have invested many thousands of dollars in the investigation of specifically directed antibody milk products along the line reported earlier by W. E. Petersen of the University of Minnesota. This highly controversial, yet very intriguing approach has progressed to the point that patented products are available for human and animal use, but efforts are now concentrated in the animal field.

Many veterinarians in Iowa use these products in calves and pigs with results which merit further consideration. Editor.

Initially, a preliminary test on a single calf was carried out to determine the efficacy of a specifically directed bovine lacteal concentrate (Gnoto Lacteal Secretion, Impro, Inc., Waukon, Iowa) against the scour-pneumonia complex of calves. Success of this test led to 7 other controlled tests of this product.

A young Holstein bull calf was placed in a Calfloo (individual pen) on June 25, 1959. It soon developed scours and then pneumonia. After 5 weeks, the calf was alive and able to stand, but began to drink excessive amounts of water. It then lost most of its hair and gained only 10 lb. in 37 days. It appeared the calf would not survive. During this time, the diet contained a high level of antibiotics.

On August 1, all antibiotics were removed and the calf was fed a ration of grain, hay and water. It was given 10 quarts of antibody milk concentrate orally, 3 pints morning and night for 3½ days. The calf then began to put on weight. By August 30 it weighed 169 lb., an average daily gain of 2.4 lb. The calf was slaughtered on February 15, 1960, when it weighed 850 lb. The average daily gain from August 30 to February 15 was 4.1 lb.

Clinical Study

Seven groups of calves were studied to determine effectiveness of a polyvalent antibody milk concentrate against the pneumonia-scour complex. Experiments were

conducted from February 5, 1960 to August 27, 1961. This period included severe winter weather as well as ideal summer weather. Of 34 infected calves, 18 were injected with polyvalent antibody milk concentrate. Sixteen calves served as controls.

It was felt desirable to infect the calves naturally rather than challenge them with large doses of a specific pathogen for this study. Philips' report at Lobund Institute, Notre Dame University, provided additional evidence it would be better to infect the calves naturally. This study showed that bacteria become pathogenic according to combinations formed.

All calves were purchased from 2 sale barns so that the history of each would be known and be the same. This is important, since one pathogenic microorganism was encountered which killed all the calves in one out of several experiments herein described. It clearly demonstrated that the antibody protection was specific and that the globulin *per se* was not protecting the calves.

The bovine lacteal concentrate used in these tests was prepared from milk produced by cows whose udders had been infused with a polyvalent calf antigen. This antigen was composed of bacteria commonly associated with diarrheas and pneumonias in calves. The same antigen was used to produce milk given orally to the calf in the preliminary experiment. All calves were given 30 cc. of the lacteal concentrate intraperitoneally.

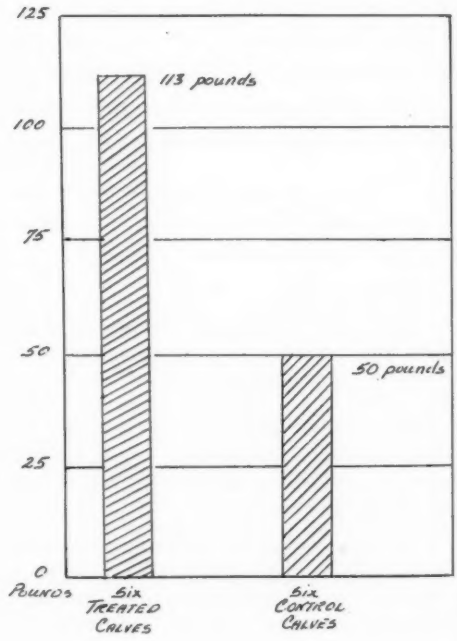
The plan was as follows: (1) To buy 3 or 4-day-old calves through a sale barn. (2) To mix these calves, (this was done usually automatically at the sale barn) and haul them to the experimental lots in the same truck. (3) To place the new calves with calves which have or have had scours and/or pneumonia. (4) To conduct some experiments in winter, when intensity of pneumonia-scour complex is usually most severe, but to continue the tests during summer months.

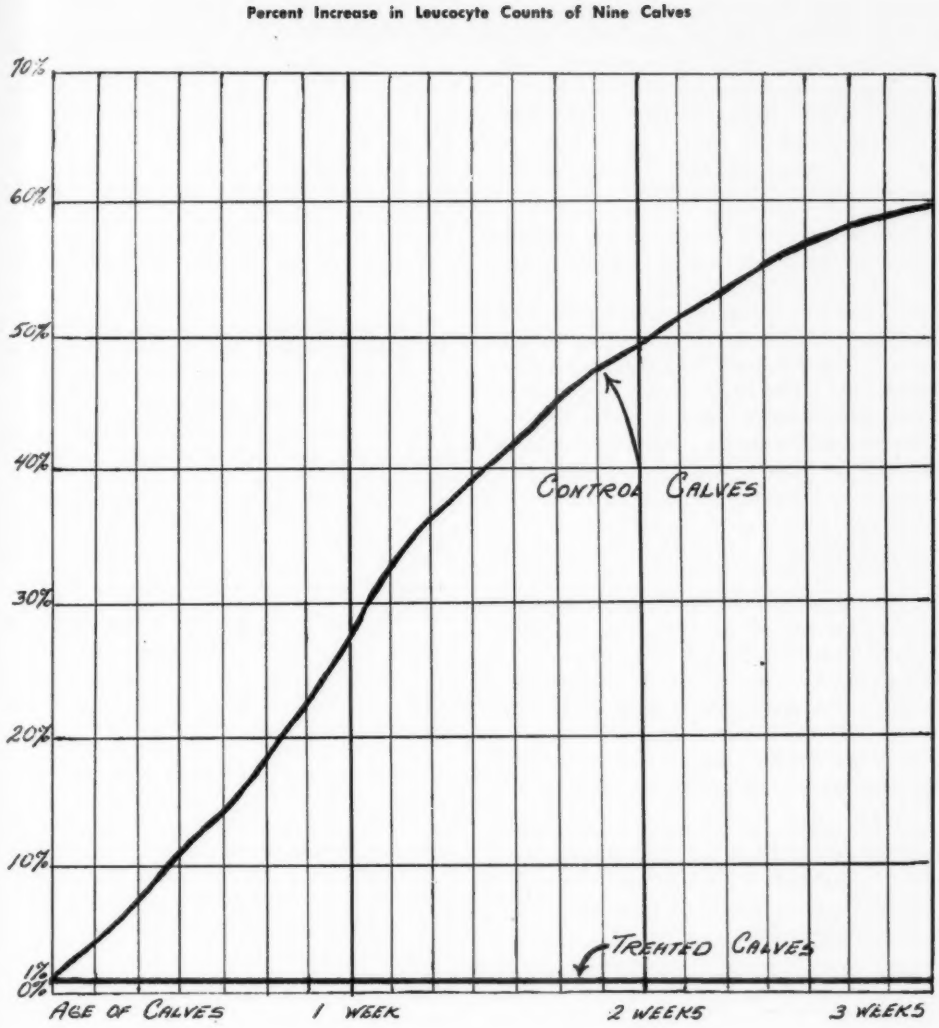
Experiment 1: Eight Holstein calves a few days old were purchased at a sale barn on February 5, 1960 and moved to a farm where they were allowed to nurse cows. Four were injected with 30 cc. of lacteal concentrate and 4 were not treated. The 4 treated calves developed slight scours but their appetite and general health remained good. The control calves developed severe scours and became dehydrated. They were then treated with 50 cc. of the lacteal concentrate. In 5 days they appeared normal. All were kept 43 days. The treated calves averaged 208 lb., while control calves averaged 180 lb. All had weighed about 80 lb. at the start of the test.

Experiment 2: Three Holstein calves and one Guernsey calf were purchased on February 18, 1960. They were hauled in an open truck to the experimental quarters. Two were treated. All the calves in this group died. However, the 2 control calves died on the 5th and 6th day, but the 2 treated calves lived about 2 weeks.

The lungs of one treated calf were sent to the Diagnostic Laboratory at Iowa State

Total Weight Gains of 12 Calves in Experiments Four, Five and Seven





University, Ames, Iowa. The laboratory report stated that *Pasteurella hemolytica* was isolated from the lung tissue. Gross examination of the lung tissue also revealed a severe fibrinous bronchopneumonia which is characteristic of a Pasteurella pneumonia.

Pasteurella hemolytica was not in the polyvalent antigen used to infuse the udders of cows for production of this antibody lacteal concentrate.

Experiment 3: This group consisted of 3 Holstein, 2 Guernseys and 1 Brown Swiss. These calves were kept for 20 days in severely infected quarters. The 3 treated calves grew rapidly and appeared normal. All 3 control calves died within 2 weeks from scours followed by pneumonia.

Experiments 4, 5 and 7: These tests were run for 23, 24 and 21 days respectively. There were 2 control and 2 treated calves

in each experiment. These tests were conducted during summer when the scour-pneumonia complex is not as severe. While the control calves did not die, the treated calves showed a higher average weight gain. The treated calves gained an average of 19 lb. as compared with 8.3 lb. for the controls during this period.

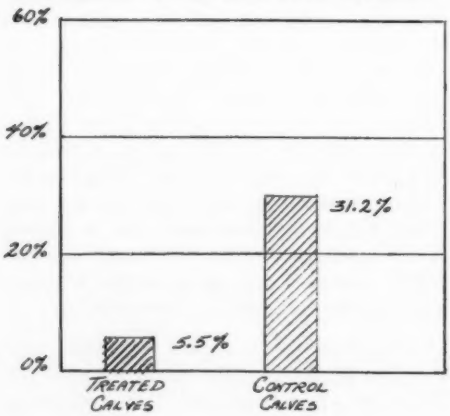
Experiment 6: Three out of 4 calves in this group were in poor condition and not expected to survive. They were treated with available scour preparations but did not respond. The same 3 calves were then treated with the specifically directed lacteal concentrate. The healthy calf was used as a control. During the next 3 weeks, 2 of the 3 treated calves gained more weight than the healthy control calf.

Conclusions

The scour-pneumonia complex in calves is probably caused by a virus in the early stages. This is indicated by a drop in the white blood count about 30 hours after birth. Secondary invaders such as *E. coli,* Salmonella and *Pasteurella multocida* soon follow and produce signs observed by livestock producers and veterinarians.

This phase is where the specifically directed antibody lacteal concentrate is of value. It appears to help protect the young animal against specific organisms during this weakened state.

Death Loss in 34 Calves of Seven Experiments



Summary of Mortality

	No. of Calves In Study	Control Calves		Experimental Calves	
		Lived	Died	Lived	Died
Exp. 1.	8	4	0	4	0
Exp. 2.	4	0	2	0	2
Exp. 3.	6	0	3	3	0
Exp. 4.	4	2	0	2	0
Exp. 5.	4	2	0	2	0
Exp. 6	4	1	0	3	0
Exp. 7.	4	2	0	2	0

In these studies, all calves tested during the cold weather developed a diarrhea by the 4th or 5th day. A rise in body temperature was an indicator of secondary bacterial invaders at this time. Those calves treated with the antibody milk concentrate maintained a lower body temperature after the 5th day than did the controls. The control calves became very ill and it was difficult to keep them alive even with administration of electrolytes and antibiotics.

Two control calves were treated with 100 cc. of antibody milk concentrate intraperitoneally during this critical period. They recovered, but never grew as fast as the calves treated early.

The total white count appears to be another indicator of the efficacy of this antibody milk concentrate. There was only a slight increase in the total white blood count of calves injected with the concentrate when placed on test, while their control mates' total white counts rose about 60% above normal.

These experiments have shown that calves raised during the summer months are not affected with as severe a form of the scour-pneumonia complex. Yet calves treated with the antibody milk concentrate grew more rapidly than their untreated pen mates. This concentrate will prevent the slight infections that retard animal growth. A specifically directed antibody lacteal concentrate appears to be an economical way to reduce sickness in calves during the first weeks of life.

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Iowa Takes Action on Hog Cholera Eradication

John B. Herrick, D.V.M.
Extension Veterinarian

Iowa, the state that raises one-fifth of the nation's hogs, is in the midst of formulating a program to control and eventually eradicate hog cholera. This seems like a gigantic task to those spearheading the program, yet it is a worthwhile one aimed at reducing the estimated $8,000,000 annual loss Iowans suffer because of this disease.

Twelve foreign countries now have embargoed Iowa pork because of cholera virus and this, plus the fact other countries such as Canada have eradicated the disease, has stimulated the world's greatest pork-producing area to develop similar programs.

Leading swine producers, processors, distributors, the farm press, animal disease eradication personnel, practicing veterinarians, the state federal extension service and others are working together in an effort to formulate an educational and active program directed toward eventual eradication of the disease. After years of committee conferences, talk has turned to action. Now there is a concerted drive on cholera to accomplish what has already been done with other diseases, such as Texas fever and vesicular exanthema. Mr. Marion Steddem, a swine producer of Granger, Iowa, is chairman of the Iowa Hog Cholera Eradication Committee. Ten veterinarians are on the committee.

The following progress has been noted. Effective in 1962, a disease reporting system will be enacted so all cases of cholera will be reported to regulatory officials and the swine quarantined. A feeder pig bill to place more stringent control on movement of feeder pigs was passed at the recent Iowa legislative session and will be effective in controlling movement of pigs from other states.

The Iowa Hog Cholera Eradication Committee has formulated recommendations needed for a successful program. These are to conform with the National Hog Cholera Committee recommendations. The recommendations are: (1) To increase the number of hogs vaccinated. Various authorities estimate that from 65% to 75% of all swine need to be immunized to bring the disease under control and prevent epidemics of the disease. At the present time it is estimated that less than 35%-45% of all hogs in Iowa are vacinated. Various segments of the industry are presently working on a program to encourage the use of vaccination on a voluntary basis by livestock producers. (2) To discontinue the use of a fully virulent hog cholera virus as an immunizing agent. This has been done in Iowa in previous legislative sessions. (3) To heat treat all garbage used in swine feed to prevent introduction and spread of disease through this medium. This also has been done in Iowa. (4) To promote legislation or regulations prohibiting movements of hogs vaccinated with virulent virus from all places of public sale. This, in effect, has been done. At the present time vaccinated pigs are under control by regulatory officials and the live hog cholera virus is not used. (5) To require all counties to include hog cholera as a reportable disease. Reporting of the disease and quarantine of infected swine is to be enacted as of Jan. 1, 1962. (6) To encourage laboratory confirmation reports in cases of hog cholera. No action as yet has been taken on this in Iowa. (7) To dispose of condemned carcasses. Carcasses of swine condemned on the program should be disposed of by burning or rendering under supervision. This procedure is followed at such places as sale barns but no effort has been made to control this on the swine producing farms. Swine that have died from hog cholera have largely been handled through rendering plants. (8) To enact a strong educational program. This is to be carried on in full force during the current year by all segments of the industry.

PRACTITIONER'S LABORATORY

A Rapid Antibiotic Sensitivity Test

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Sir Arthur Fleming wrote, in 1929, "the inhibitory power can be accurately titrated by making serial dilutions of penicillin in fresh nutrient broth, and then implanting all the tubes with the same volume of a bacterial suspension and incubating them. The inhibition can then readily be seen by noting the opacity of the broth."[1] At that time, veterinary practitioners had no trouble selecting an antibiotic. Today the increasing number of chemotherapeutic agents available to veterinarians is bewildering. Some basis for selection is needed. The easiest and handiest way to select such an agent is the antibiotic sensitivity test using paper-impregnated discs. In this laboratory, we find other methods require too much preparation time, are difficult to read or are simply too slow. Our search for more speed resulted in the test described in this paper.

The agar diffusion test has been most widely used. In this test, the culture is smeared on an agar plate and various antibiotic impregnated discs are placed on it. Results are read in 18 to 24 hours as zones of inhibition of the bacteria. This technic has proved too slow for the practitioner's needs. Thus he often must use his judgment on the starting antibiotic, changing later if test results indicate.

More recently Jackson, *et al.*[2] used the reduction of hemoglobin as an indicator of bacterial growth. This growth reduces the hemoglobin and changes its color from bright red to dark red. Inhibition of bacterial growth, of course, prevents this change. This test has been modified by Bass, *et al.*[3]

The use of tetrazolium salts in broth cultures by Rajam, *et al.*[4] and on paper strips by Ryan *et al.*[5], suggested a compromise use practical for veterinary diagnostic laboratories. A method using resazurin was considered too involved for routine use.[6]

Materials: Sensitivity test agar (Difco) was found to be satisfactory. It should be emphasized that a medium must be as low as possible in para-aminobenzoic acid (PABA) if sulfonamides are to be tested. Otherwise such agents are difficult to test due to their poor solubility and inactivation by PABA. The selected medium was prepared in screw-cap 15 ml. tubes.

A solution of tetrazolium salt was prepared by dissolving 0.5 gm. of 2,3,5-Triphenyl-2H-tetrazolium chloride and 2.0 gm. of sodium succinate (Eastman Kodak) in 100 ml. of 0.85% solution of sodium chloride. The solution was filtered through a Seitz pad for sterilization. Heating proved

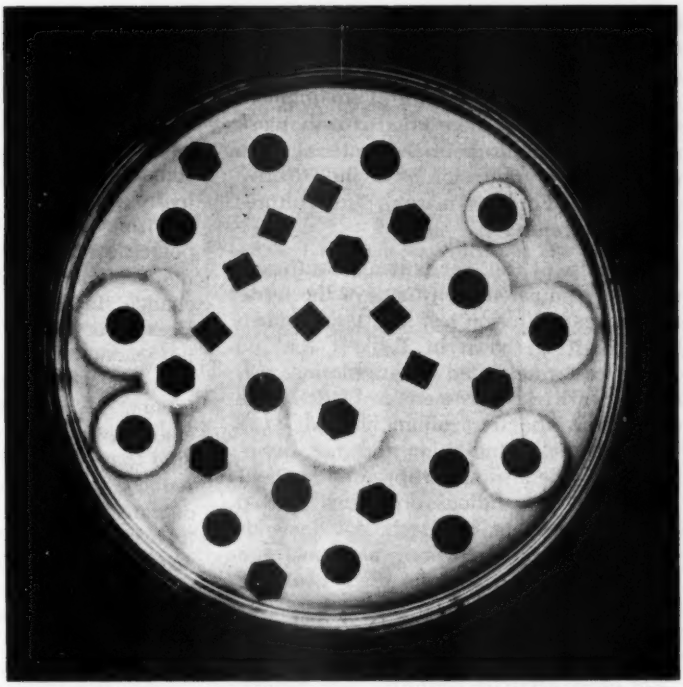

Fig. 1

Photograph of a tetrazolium agar sensitivity plate. Note the clear circular zones around inhibitive discs. This plate was 3 months old when photographed.

detrimental. A pure culture in saline suspension or in broth should be used.

Technic:

1. One tube of agar medium was melted in a boiling water bath for each organism to be tested.

2. One-half (0.5) ml. of a heavy suspension of organisms or an 18-hour growth in heart infusion broth was pipetted into a petri dish.

3. Three to four-tenths (0.3 to 0.4) ml. of the tetrazolium solution was added.

4. Melted agar cooled to 45 C. (113 F.) was poured into the dish, which was rotated to insure good mixing.

5. Antibiotic discs of the desired kind and concentration were placed on the agar after it had hardened.

6. Results were read after as little as 1 hour and usually not later than 3 hours incubation.

Results: The tetrazolium agar diffusion technic has been in use at this laboratory for the past 18 months. Comparisons with the hemoglobin reduction test[3] and the standard agar diffusion test[7] have shown it gives identical results but is more easily read and much faster. Completely clear zones were observed, without the frequent problem of overgrowth of organisms. Fig. 1 reveals clear circular zones only around the inhibitive antibiotic discs and shows many discs can be tested at one time. Stability of the test is demonstrated by the fact the test in Fig. 1 was approximately 3 months old when photographed.

The time required for conducting the test after receipt of the specimen by the laboratory depends upon whether the body fluid or exudate is used in the test rather than a pure culture. In the latter case, 18 to 24 hours are necessary before the test can be set up. Testing swabs or pus directly, although not recommended, does reduce the

testing time to 2 to 3 hours. However, one must be aware of certain factors which may produce false results. Saprophytic organisms or those from the natural environment may, as a result of more rapid growth, mask pathogenic organisms in the material, thus giving a false impression as to the effective antibiotics. For this reason, pure cultures are to be preferred.

Results of the standard agar diffusion test were compared with those of the tetrazolium agar diffusion test at a large human hospital. It is shown in Table 1 that no differences were found in antibiotic sensitivity. Sensitivity test medium (Difco) was used. With the tetrazolium method: (1) vague zones of inhibition did not occur, (2) clearly defined zones appeared in about 2 hours, (3) fastidious organisms reacted clearly, (4) no tedious technical demands were made upon the testing personnel and (5) many more antibiotic discs could be tested at one time on a single plate.[8] It was particularly pointed out that persons with no experience in sensitivity testing could make accurate readings. The technic is being evaluated at 2 other laboratories, after which more detailed results will be published.

Discussion

Tetrazolium salts have long been known for their use as indicators of succinic dehydrogenase activity. Stability of the formazan compounds produced upon the reduction of tetrazolium salts has made them attractive as indicators of such enzymatic activity. The fact formazans are insoluble and colored makes them especially adapted as biological indicators. The reaction produced in this test is not a direct measure of succinic dehydrogenase, but the result of reactions occurring through an electron transport chain with a tetrazole as the final hydrogen acceptor.[9] With the use of the tetrazole agar diffusion technic, the end point does not represent a visualization of the bacteria themselves, but only a color change indicating formazan production.[8] Because of the lag phase of most pathogens, not more than one bacterial generation develops before the marked color reaction occurs. Many tetrazolium compounds are available from which to choose. It is desirable that such a compound (1) be readily reduced by succinic dehydrogenase, (2) operate aerobically, (3) not be inhibitive to bacterial growth and (4) not be so reactive that small amounts of succinic dehydrogenase reduce the compound before agar diffusion of the antibiotic has occurred. It has been shown by Nachlas, *et al.*[10] that certain compounds, one being phenazine methosulfate, coupled with certain new tetrazoles can act as electron carriers to tetrazolium salts and thereby produce a direct reaction (much faster) as compared with the reaction reported here. One of the new tetrazoles is 2,2,5,5′-tetraphenyl-3,3′-dimethoxy-4,4′-biphenylene ditetrazolium chloride. The possibility of adapting such a reaction to the sensitivity testing of antibiotic substances is being investigated.

TABLE 1

Organisms (Human Strains) Tested Using the Tetrazolium Agar Diffusion Test Compared with Results Using the Agar Diffusion Test

Organism	No. of Strains	Reaction to Antibiotics in Each Test
Staphylococcus aureus	6	Identical
D. pneumoniae	3	Identical
Salmonella spp.	2	Identical
Streptococcus uividans	6	Identical
Streptococcus pyogenes	5	Identical
E. coli group	10	Identical
Proteus spp.	5	Identical
Pseudomonas spp.	4	Identical

The paper disc test introduced by Scherr[11] was a major step toward solving many drug selection problems. Since that time many technics for its use have been reported. The earliest technic was the tube dilution test. It has been pointed out that even though this technic is considered more accurate, it is difficult to correlate antibiotic tissue levels attainable in animals with *in vitro* sensitivity of antibiotics.[12] Furthermore, however attractive such correlations may appear in theory, in practice they often fail. Considering the differences in animals such as age, breed, type of lesions and general physiological state at the time of drug administration, extrapolating results gained from any method of sensitivity test-

ing is rather perilous.[13] One would think a good paper disc method for determining microbial sensitivity to antibiotic substances would be sufficient for veterinary practice.[7] But Starkey, *et al.*[14] concluded these could be used only for screening and were not satisfactory as a standard method.

Precautions: Although clinical response based on this technic has been satisfactory,[6] it should be emphasized that no present means of selecting antibiotics for treatment can supersede careful judgment by the practitioner. Because of many misinterpretations of results from such tests, workers have erroneously used some of the information obtained. Variations in the agar diffusion rates of various chemotherapeutics and differences in media, drug levels and other important factors have caused confusion in interpretation. Chief among these is the belief that the size of the inhibitory zone is important in selection of an antibiotic. Branch, *et al.*[15] have shown the zone of inhibition to be a function of so many factors, (composition of the medium, depth of the agar, amount of moisture in the plate, and the rate of diffusion of the agent in the agar) that the size of the inhibition zone is not very meaningful. The fact that visible bacterial growth is not necessary in the tetrazolium agar diffusion test would tend to eliminate the effect of the size of inoculum on the diameter of the inhibition zone. In the agar diffusion test Linton[10] pointed out that the inoculum size definitely affected the inhibition zone size.

Summary

A solution of 2,3,5-Triphenyl-2H-tetrazolium chloride has been incorporated into a simple, easily prepared and stable medium for sensitivity testing. Tests have been easily interpreted after short incubation. Eighteen months of satisfactory use in this laboratory and limited laboratory use by a human hospital would seem to establish the desirability of such a test.

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The technical assistance of Robert Jones (deceased) and Joseph Baucom has been appreciated. Many helpful suggestions also were made by staff members.

LARGE ANIMAL PRACTICE

An Outbreak of Bordetella bronchiseptica Pneumonia in Swine

Conrad L'Ecuyer, D.V.M., E. D. Roberts, D.V.M. and W. P. Switzer, D.V.M., Ph.D.
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In the course of studies on swine pneumonia, an outbreak of pneumonia in a herd of approximately 100 swine with nearly 100% morbidity was brought to our attention. The animals involved were from 2 to 5 weeks of age and were housed under poor conditions. The younger animals were the most seriously affected. They were depressed, unthrifty and coughed severely when exercised. Four animals were selected for examination. *Bordetella bronchiseptica* was recovered from the lungs of these 4 animals. Both the gross and microscopic appearance of the pneumonia was unlike that described for either virus pneumonia of pigs or swine influenza. This report presents information on the production of pneumonia with pure cultures of *B. bronchiseptica* as well as information on the gross and microscopic lesions observed in both naturally occurring and experimentally produced cases of *B. bronchiseptica* pneumonia.

Bordetella (Brucella) bronchiseptica is a common inhabitant of the respiratory tract of healthy or diseased dogs, cats, swine and laboratory animals. Phillips[1] recovered *B. bronchiseptica* from swine in 8 Ontario herds with histories of chronic cough, unthriftiness and variable mortality. Ray[2] cultured the organism from unthrifty pigs suffering from chronic pneumonia. Spray[3] recovered *B. bronchiseptica*-like organisms from 3 of 100 normal swine lungs and from 5 of 314 grossly pneumonic swine lungs. In a similar study, Thorp and Tanner[4] recovered *Bordetella*-like organisms from 11 of 166 grossly pneumonic swine lungs. More recently Ryu[5] recovered *B. bronchiseptica (Alcaligenes)* from lungs of 25 of 108 pigs with pneumonia complicated by various other conditions. Switzer[6] reported pure cultures of *Bordetella bronchiseptica (Alcaligenes* sp.) produced turbinate atrophy and pneumonia in experimentally infected pigs. He also noted the organism seemed to lose its virulence rapidly when cultured on artificial medium. L'Ecuyer *et al.*[7] recovered the organism from 2 of 86 pneumonic swine lungs. Winsser[8] has comprehensively reviewed the literature concerning *B. bronchiseptica.*

Bacteriological studies were carried out on 5% horse blood agar and identification was made by routine bacteriological meth-

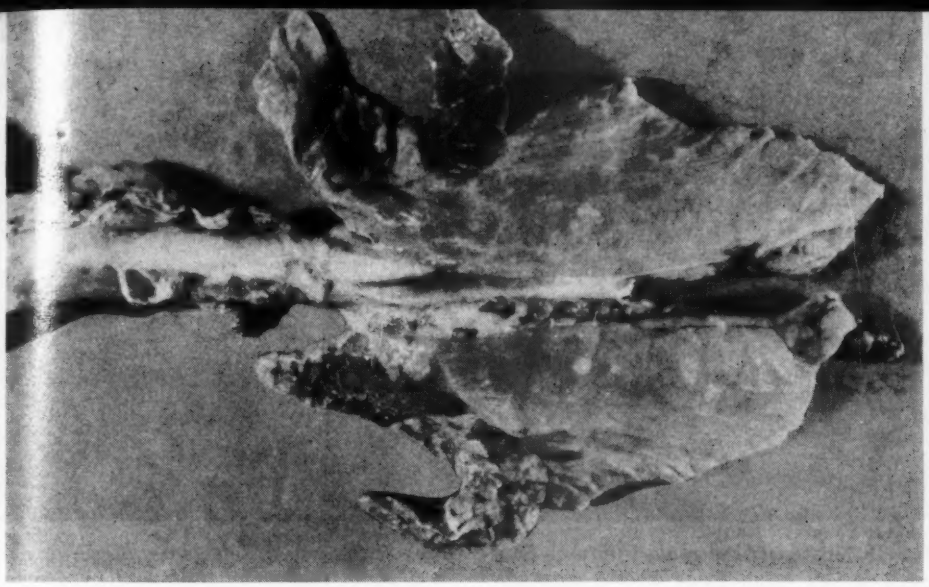


Fig. 1. Experimentally produced B. bronchiseptica pneumonia in an 8-week-old pig, 11 days post-inoculation.

ods. Attempts to culture and identify *Mycoplasma hyorhinis* (PPLO) were made according to the methods of Switzer.[9] Virus isolation attempts were made in primary swine kidney cell cultures prepared according to the method of Switzer.[10] The *B. bronchiseptica* used in the transmission attempt was recovered from the naturally occurring pneumonia outbreak and was passaged once in 7-day-old chicken embryos by chorioallantoic sac (CAS) inoculation. One-tenth ml. of approximately a 1:100 suspension of organisms was used to inoculate the embryos. Fluids from dead embryos were harvested, cultured and frozen. These fluids yielded pure cultures of the organism and were subsequently used for inoculation of swine. The pigs used in the transmission trial were each given 4 inoculations of infective CAS fluids diluted 1:10 in Dulbecco's phosphate buffer.[11] The inoculations consisted of 4 ml. of diluted CAS fluids given intratracheally on the first day of the experiment and of 4 ml. given intranasally on each of the 3 following days.

Antibiotic sensitivity trials were carried out on solid medium with Bacto sensitivity disks (Difco). Tissues collected for histopathological studies were fixed in Zenker's solution, processed using the paraffin technic, sectioned at 6 microns and stained with hematoxylin and eosin. The pigs used for the transmission trial were approximately 8 weeks old and were from a respiratory disease-free herd maintained in quarantine for 7 years.

Observations

Bacteriology: The lungs of 2 pigs from the initial outbreak yielded pure cultures of *B. bronchiseptica*. Lungs of the third pig yielded *B. bronchiseptica* in conjunction with *Escherichia coli* and lungs of the fourth pig yielded *B. bronchiseptica* in conjunction with an alpha hemolytic streptococcus. In no case was *Mycoplasma hyorhinis* or a detectable virus recovered from any of these lungs.

After 24 hours' incubation at 37 C., blood agar plates inoculated with pneumonic lung material showed numerous convex, gray-white, semitranslucent colonies measuring 1 mm. to 1.5 mm. in diameter.

After 48 hours' incubation these colonies had enlarged to 3 mm. to 4 mm. in diameter. The colonies had become markedly convex, creamy yellow in color and opaque. The colonies of recently isolated *B. bronchiseptica* were surrounded by a 1 mm. to 2 mm. wide zone of clear hemolysis.

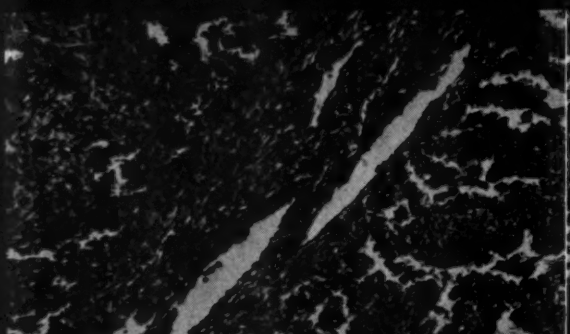


Fig. 2. Interstitial alveolar fibrosis with small foci of hemorrhage from a naturally occurring case of B. bronchiseptica pneumonia. H and E x 60.

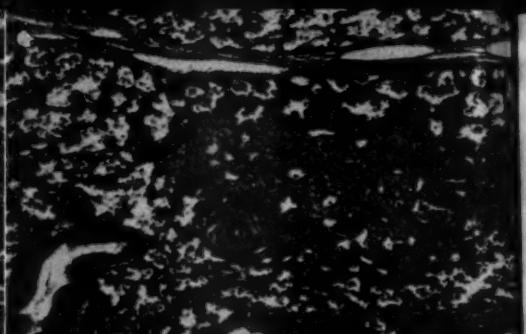


Fig. 3. Interstitial alveolar fibrosis in experimental pneumonia produced by a pure culture of B. bronchiseptica. H and E x 60.

Organisms recovered from the pneumonic lungs were morphologically and biochemically typical of *B. bronchiseptica* and were characterized by rapid urease production.

The antibiotic sensitivity of the strains studied was identical. *B. bronchiseptica* was sensitive to chlortetracycline, oxytetracycline, tetracycline, chloramphenicol and to the sulfa drugs. It was only slightly sensitive to streptomycin and erythromycin and was resistant to penicillin, furacin and furadantin.

Symptomatology: On the fifth day following the first inoculation (PI) the 2 experimental pigs were mildly depressed and both coughed when disturbed. Both animals were observed to cough each day during remainder of the experiment. Temperatures were taken daily after the appearance of symptoms and at no time did they exceed 104.2 F. Throughout the observation period the animals' appetite remained good as did their general condition. Both animals were necropsied 11 days PI. Necropsy revealed extensive pneumonic areas involving the apical and cardiac lobes (Fig. 1).

Pathology: The early lesions of naturally occurring *B. bronchiseptica* pneumonia were bluish tan in color and located in the apical, cardiac and intermediate lobes. On palpation of involved areas, the bronchi were quite firm and enlarged. Serous lymphadenitis of bronchial lymph nodes was present. Microscopic changes at this stage consisted of marked hyperemia of propriomucosa and peribronchial vessels and of lymphocytic infiltration of the propriomucosa. The alveolar exudate consisted of many neutrophiles and lymphocytes, associated with edema and fibrin. Interlobular lymph spaces contained neutrophiles, lymphocytes and fibrin. The pleura was normal in appearance.

Naturally occurring *B. bronchiseptica* pneumonia cases of approximately 2 weeks' duration exhibited lesions that were grayish-yellow in color and very firm and fibrous on palpation. In addition to the fibrotic areas there were several small active, purple-colored foci scattered throughout the anterior portion of the lungs. The entire apical and cardiac lobes were involved. Cross sections of the involved areas revealed numerous minute, brownish-colored, necrotic foci. In some animals these necrotic foci had formed abscesses. Cases at this stage were characterized microscopically by degenerative changes of the bronchial and bronchiolar epithelium, by scant bronchial exudate and by lymphocytic infiltration of the propriomucosa and peribronchial tissues. The alveolar exudate consisted of neutrophiles and many septal cells. Alveolar inter-

stitial fibrosis was marked, and in some areas it was associated with epithelialization of many alveoli. Vascular damage was prominent in many areas. This consisted of medial hyalinization of the small arterioles. In areas undergoing interstitial fibrosis large foci of hemorrhage and necrosis were seen.

The experimentally produced cases were examined 11 days PI and presented lesions that were very firm in consistency and grayish pink in color. The lesions were located in the cardiac and apical lobes. In addition, small foci were present in the diaphragmatic lobes. Cross sections of the lesions revealed the same small, brownish, necrotic foci observed in the naturally occurring cases. The microscopic changes observed were identical with those present in naturally occurring cases except that abscess formation was not seen.

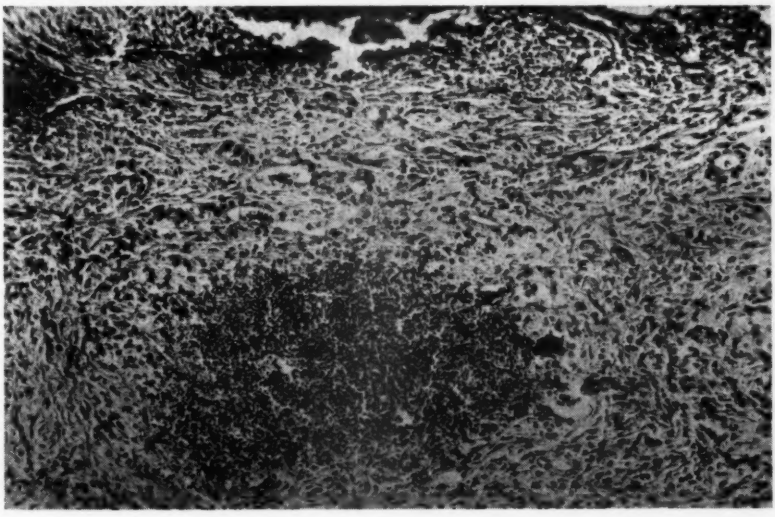
Discussion

The incidence of *B. bronchiseptica* pneumonia in swine cannot be fully evaluated at this time. This is only the second report on the experimental production of pneumonia with pure cultures of this organism. It can be concluded, however, that this organism is potentially important as a cause of swine pneumonia, since unpublished observations made by workers at this Institute show this organism to be frequently present in the nasal cavity of swine.

The loss of pathogenicity of *B. bronchiseptica* due to cultivation in artificial media seems to have been circumvented by passage of the organism in chicken embryos. It was noted that cultures of the organism from the CAS fluids of embryos dying within 48 hours PI produced little or no hemolysis on 5% horse blood agar, while cultures from the fluids from eggs dying on or after 5 days PI produced zones of clear hemolysis up to 2 mm. wide. This was taken to indicate that passaging the organism in chicken embroyos with a small inoculum tended to lengthen incubation period and to select more pathogenic strains of the organism.

The pathogenesis of lung lesions has not yet been adequately elucidated but the reaction seems to be largely due to a severe irritant, probably in this case due to a bacterial exotoxin. The irritant appears to produce early vascular damage resulting in local hyperemia and hypoxia, with alveolar interstitial fibrosis and epithelialization

Fig. 4. Experimental B. bronchiseptica pneumonia in an 8-week-old pig. Note the marked alveolar fibrosis with focal hemorrhage. These areas are discernible grossly on cross section of the involved lobe, as small brownish-red foci. H and E stain x 120.



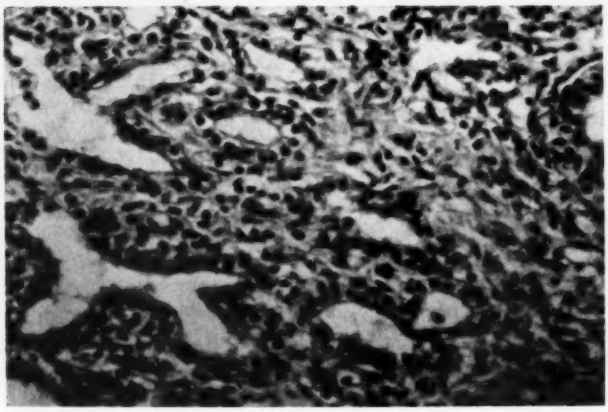


Fig. 5. Experimental B. bronchiseptica pneumonia showing interstitial alveolar fibrosis and epithelialization of the alveoli. H and E x 450.

the final result. Geever *et al.*[12] stated that a severe irritant is capable of inducing septal cell proliferation and epithelialization of the alveoli.

The recognition of *B. bronchiseptica* as a primary etiological agent of swine pneumonia poses a problem in differentiation from other swine pneumonias. This condition is easily confused clinically with VPP. However, necropsy observation of cases of *B. bronchiseptica* pneumonia reveals the early stages are characterized by actively hyperemic areas, whereas more chronic lesions are characterized by fibrosis. Lesions at both stages may be present in the same lung. Cross sections of involved lobes reveal numerous small brownish-red foci. These changes were present in both the naturally and experimentally produced cases. These foci are characteristic and are of considerable aid in making a presumptive diagnosis of this condition. Confirmation of the diagnosis can be made by isolating the organism and by histopathological examination.

Summary

This report describes the bacteriology, symptomatology and pathology of naturally occurring and experimentally produced *B. bronchiseptica* pneumonia in swine. The authors feel this organism may be important as an agent of pneumonia in swine.

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Magnesium Sulfate for Euthanasia in Cats

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In modern veterinary practice, a more humane, rapidly effective, feasible, practical and economical method of euthanasia in animals is highly desirable. A wise selection of the drug or method for this purpose is an extremely important consideration in the veterinarian-client relationship. The importance of euthanasia is all the more to be appreciated when the owner of the animal is a witness in the procedure. While numerous drugs and technics for euthanasia in cats have been reported, more studies are needed for safe and humane disposal of experimental, hopeless or old animals. In view of this necessity, the present study was undertaken.

Pentobarbital sodium is accepted by many clinicians as the drug of choice for small animal euthanasia.[1-4,6] This drug probably is used more frequently because of its availability.[4] The desirable dose given by Jones is twice the anesthetic dose intravenously and 3 times the minimal dose if administered intraperitoneally or intrapleurally. Gentry[1] recommends a dose of 0.5 gm. per lb. intravenously and Schnelle[6] 1 cc. per 5 lb. body weight of a solution consisting of 259.2 gm. pentobarbital sodium, 200 cc. of alcohol and physiological saline *q.s.* to 2,000 cc.

Strychnine administered intracardially does not result in instantaneous death.[5] Strong and undesirable reactions have been observed with its use.[4-7] It causes extreme pain, as manifested by convulsive efforts.

Chloroform is another drug used for euthanasia. Five to 10 cc. are injected intracardially or intramedularly at the atlanto-occipital joint.[1] It also is used in the bell jar method but this is reported to be unsatisfactory because of its slow action and unfavorable symptoms produced, such as excitement, frenzy and the irritating effect of heavy concentrations.[1,3,6]

The lethal chamber and electrocution are other methods used. The lethal chamber is satisfactory but must be handled carefully.[1,4,6] Electrocution produces instantaneous death but is not satisfactory in cats and dogs, because hair and fur are poor electrical conductors.[3]

Gentry[1] claims that a saturated solution of magnesium sulfate given intravenously or intracardially in small animals does not produce excitement and causes acute depression of nerve centers. Others

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Part of an undergraduate thesis presented by the junior author under the direction of the senior author on August 27, 1959 in a seminar before the faculty and students of the College of Veterinary Medicine, University of the Philippines, in partial fulfillment of the requirements for the degree of Doctor of Veterinary Medicine. Senior author is Assistant Professor and Acting Head of the Department of Veterinary Medicine and Surgery; junior author is a veterinarian in Cortez Animal Hospital, Shaw Boulevard, Mandaluyong, Rizal.

recommend it for euthanasia of large and small animals.[3,4,8,9] Jones[4] recommends a nearly saturated solution be injected rapidly to produce momentarily a high concentration of magnesium ions in the blood that will be carried to the brain.

Clinical Study

Forty-six native cats, 26 male and 20 female, were used in this study. For preliminary studies, 6 cats were injected through various routes to determine the most satisfactory route. Forty cats were injected with 8 different concentrations (10, 20, 30, 40, 50, 60, 70%, and saturated solutions, 80%) of magnesium sulfate (U.S.P.) intravenously using 5 cats per concentration. The solutions were prepared 2 to 24 hours before use. The experimental cats weighed from 4.0 to 8.6 lb. They were from 6 to 14 months of age.

The cats were placed in cages for 2 to 5 days before euthanasia. They were fed cooked rice with fish twice a day and given clean water to drink. Prior to the experiment, each cat was thoroughly examined for any diseased condition. The sex, age, weight and general condition of each cat were likewise recorded. This was followed by fecal examination for internal parasites using the sugar flotation technic as described by Coffin.[3] All these physical and laboratory examinations were done within 1 day before euthanasia.

The cat was placed on the operating table in the ventrodorsal position and its 4 limbs tied on the sides of the operating table. With the help of an assistant, the hair was plucked on the medial aspect of the thigh where the femoral vein is located. The pupillary changes of each cat were carefully noted after restraint, during the course of injection and immediately after death of the animal. Similarly, the heart beat was determined with the use of the stethoscope and the respiration rate was taken by observing the movement of the flank. The rate of injection for all the concentrations used was maintained at 1.0 cc. per 2 seconds until euthanasia was attained. As soon as the heart beat stopped, the amount actually given and antemortem reactions were noted. The postmortem examination was performed on all cats immediately after euthanasia, noting any pathological conditions observed internally.

The summary of the range and mean of doses of various concentrations is shown in Table 1.

Antemortem Findings During Injection: In general, the following antemortem reactions observed during the intravenous injection of 10, 20, 30, 40, and 50% solutions were: involuntary urination; slight muscular tremors; pupils constricted at the start, then dilated at the latter stage of injection; heart beat and respiration rates first increasing, then rapidly decreasing as death approached. The injection of 60, 70%, and saturated solutions produced stronger muscular tremors, which were in the form of jerkings of the limbs. Seven cats (17.5%) given 20, 30, 40, 50, 60, 70% and saturated solutions showed involuntary defecation; 33 cats (82.5%) given all the concentrations showed involuntary urination; and 1 cat (2.5%) given 50% solution exhibited groaning during the process of injection. Only 4 cats (10.0%) showed moderate dilation of the pupils during the beginning of injection when given 10, 20, 30 and 40% solutions. Three cats (7.5%) given 50, 60% and saturated solutions showed no dilation of the pupils until soon after death. With all the concentrations used, the heart stopped ahead of the respiration.

TABLE 1

Summary of the Range and Mean of Doses of Various Concentrations of Magnesium Sulfate Solution Injected Intravenously for Euthanasia of Cats

Concentration (per cent)	Range (cc./lb. body weight)	Mean (cc./lb. body weight)
10	4.17 - 4.77	4.35 ± 0.11
20	3.26 - 3.91	3.66 ± 0.11
30	3.48 - 3.75	3.59 ± 0.05
40	2.42 - 2.75	2.50 ± 0.06
50	2.03 - 2.36	2.15 ± 0.06
60	2.04 - 2.45	2.18 ± 0.07
70	1.91 - 2.50	2.17 ± 0.10
80 (Saturated)	1.22 - 1.88	1.61 ± 0.13

Figure after ± is standard error.

Euthanasia was attained rapidly mostly by stronger concentrations and at the same time the volume used was less. The saturated solution of magnesium sulfate is the ideal concentration for euthanasia in cats as was found by Gentry[1] in small animals and by Aranez and Caday[9] in dogs. In this study, the cats needed from 1.22 to 4.77 cc. per lb. body weight of varying strength of magnesium sulfate solution given intravenously (Table 1). This is more than required for dogs, which received from 0.62 to 2.93 cc. per lb. body weight, as reported by Aranez and Caday.[9]

Postmortem findings: The gross postmortem findings revealed all of the 40 euthanatized cats given various concentrations of magnesium sulfate showed fully distended heart with unclotted blood, relaxed cardiac muscles and congested lungs. One cat showed focal necrosis of the lungs, and another cat showed hemorrhagic lungs when given 60% solution, but the former was suffering from distemper and ancylostomiasis and the latter from coccidiosis.

The observations on the antemortem and postmortem findings conformed with the findings of Aranez and Caday[9] in dogs.

Sex: Twenty-two male cats (55.0%) received from 1.22 to 4.77 cc., while 18 female cats (45.0%) received from 1.82 to 4.31 cc. per lb. body weight intravenously in various concentrations of the drug until euthanasia was produced. It appeared there was not much variation of the doses per lb. body weight in so far as sex is concerned.

Age: With very few exceptions, older cats received smaller doses per lb. body weight than younger ones. However, two 10-month-old cats received smaller doses than one 12-month-old cat of the same physical condition when injected with 20% solution. Likewise, a 14-month-old cat received more solution than a 12-month-old cat when given 70% solution.

Weight and condition: All cats that received larger doses of the same concentration of the drug were either heavy, fair to good in physical condition or free from internal parasites. Seventeen cats in poor physical condition and those suffering from either ancylostomiasis, coccidiosis or ascariasis, although slightly heavier, received smaller doses per lb. body weight. More healthy cats received greater doses than those in poor condition, which was the reverse of the findings of Aranez and Caday[9] in dogs.

Conclusions

The effects of 10, 20, 30, 40, 50, 60, 70%, and saturated (80%) solutions of magnesium sulfate injected intravenously for euthanasia of 40 native cats were studied. In general, most of the stronger concentrations produced euthanasia rapidly and at the same time the volume used was less. It was found that the saturated solution was the ideal concentration to euthanatize a cat. An average of 1.22 cc. to 1.88 cc. per lb. body weight of a saturated solution was required.

Young and heavy cats in good physical condition and those free from any disease received larger doses per lb. body weight than lighter and older cats, or those in poor condition. There was not much variation in the doses per lb. body weight as regards sex.

Magnesium sulfate is cheap, widely available, rapid acting and dependably effective for euthanasia of cats.

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Things Worth Knowing about Ocelots and Margays

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All veterinarians know a lot about the domestic cats but when it comes to the wild ones, they often need more information. Roughly, wild cats can be placed in 2 groups: the smaller cats, such as the ocelot, margay, lynx, bobcat, caracal and many other exotic breeds, and the larger cats, such as the lion, tiger, leopard, jaguar, panther and cheetah.

This will deal only with 2 of the smaller breeds, ocelot and margay. They are more adaptable as pets and becoming increasingly popular because of their beauty and attraction. The ocelot and margay are 2 smooth, short-haired cats native to Mexico, Central and South America. The ocelot is about twice the size of the common domestic short-haired cat, while the margay is about common domestic cat size. Both resemble miniature leopards and are often called tiger, little jaguar or leopard cats by the public. It is not easy to differentiate the ocelot and the margay while kittens. The ocelot *(Felis Leopardus)* weighs from 18 to 45 lb. when grown and stands about 16 to 18 inches high. His name is derived from the ocelli or eye-like spots on the dark back of the ears. His color ranges from a dark brown to orange to yellow-grey with black, a broken pattern that is an ideal camouflage in the jungle. The margay *(Felis [Noctifelie] wiedii)* is much smaller than the ocelot.

Unless one understands a little feline psychology it is impossible to get along with either the ocelot or the margay. Cats are fundamentally springing, leaping, stalking animals. Cats have the longest, sharpest canine teeth of any of the carnivores. They also have the sharpest claws of all mammals. With exception of the cheetah, these claws are retractile. Cats hunt mostly at night, have a keen sense of smell and sight, and have the largest eyes of all carnivores. A light-amplifying substance called guanin is present in the eyes, which produces the familiar green glare in the dark.

Ocelots and margays usually are captured as kittens from south of the Rio Grande to Paraguay. They are exceptionally affectionate for members of the cat family after becoming adjusted to people. They like to mouth or nibble and even bite as a means of expressing affection. Knowing this helps to get along with them and understand how to handle them. Because of their wild origin they are very susceptible to disease. Therefore, extra care in housing and handling is imperative. Ocelots feed on nearly any kind of animal life, such as rats, rabbits, birds, snakes and most meats. They usually like fish and seafood of any type. In fact, they are not even afraid of water, which is unusual for members of the cat family. Their diet should be varied to prevent shortage of necessary minerals and vitamins. Feeding bone meal and glandular organs such as heart, kidney, liver, etc., allows nature to pick out needed ingredients. External parasites (fleas, ticks,

An ocelot that fell 8 stories from a penthouse roof and was successfully treated for 2 fractured limbs.

lice) and internal (hookworms, roundworms, tapeworms) should be checked for and treated. Parasites tax the vitality and prevent good health in any pet.

Of the infectious diseases, the feline family's commonest and deadliest virus is infectious enteritis (panleucopenia). Proper vaccination with modern vaccines should be insisted upon, though much remains to be desired in preventing this disease. Good sanitation with isolation from carrier animals is the basic protection.

Phenol in any form is especially toxic to felines as are many of the modern insecticides, especially chlordane. Because cats commonly lick themselves to stay clean, they ingest any chemical on their skin.

Feline surgery such as declawing, removal of the canine teeth, desexing, etc., in no way differs from procedures in the domestic dog and cat except anesthetic and general restraint require extra attention and caution. Ether is the safest anesthetic, although in proper hands, many tranquilizers and injectable anesthetics are entirely satisfactory. Too little rather than too much is a good motto in using anesthetics.

If ever a bedside manner pays off, it is in dealing with cats. Veterinarians should be felinophilistic, as cats can sense a person who is ailurophobic.

The heat period in the ocelot and margay is usually evidenced by a change in character. The cats' disposition will actually vary from normal. This is natural and needs recognition, or a mistaken diagnosis can result. A history of slight discharge, frequent urination and swollen vulva should help in diagnosing the condition. I have known felines in heat to appear nervous, unsettled, restless, rub against objects, meow constantly, roll on their backs and act as if in pain. In the ocelot this usually occurs in midsummer. The gestation period is 63 days. The average litter is 2 kittens.

Many difficulties have arisen in commercial attempts to raise ocelots and margays. This has kept the supply low and the demand high because of the challenge and rarity of owning such an exotic pet. The value of these beautiful animals should be recognized by veterinarians who handle them and the owners and patients will respond to this extra attention.

Effects of Trifluomeprazine on Dogs and Cats

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This report summarizes a series of investigations in which the effects of a new tranquilizing agent, trifluomeprazine (Smith, Kline and French Lab.) were studied on healthy animals. This compound is 10-(3-dimethylamine-2-methyl-propyl)-2-trifluoromethyl-phenothiazine hydrochloride.

In laboratory tests of its depression of spontaneous motor activity, oral doses in mice were 2.2 times as potent as equal doses of chlorpromazine. The depressive dose $_{50}$ (DD_{50}) of trifluomeprazine was found to be 2.0 mg./kg. Tests on rats showed it to be approximately equivalent to chlorpromazine in blocking conditioned responses. In dogs, it demonstrated 10 times the antiemetic potency of chlorpromazine.

The purpose of this study was to determine the effects of different dosage levels and routes of administration on the clinical behavior of dogs and cats, including the effects on vital signs, on nausea and vomiting, and the possible potentiation of central nervous system depressants.

Clinical Study

The dogs used were either purebred beagles or mongrels. The cats were from a farm source. Trifluomeprazine was given at several dosage levels, orally, subcutaneously, intramuscularly, or intravenously. In one series, trifluomeprazine, given orally or intravenously, was followed by pentobarbital sodium to determine if a potentiation or any adverse effects were demonstrable.

Oral Administration. Table 1 presents data on the oral administration of trifluomeprazine in 42 dogs. A relatively large number were barkers; all were effectively quieted. Doses of 2 mg. and 6 mg./kg. seemed to produce best all-around results. The dogs were very easy to manage from the 4 mg./kg. level up, but their unsteady gait at highest levels made it awkward to treat them.

As might be expected, when level of administration rose appreciably higher than the dose needed to quiet the animal, a few undesirable side effects appeared; *e.g.*, ataxia was pronounced at 20 mg./kg. and higher doses. Most of the effects tended to level off in degree or severity after a certain dose level was reached. After that there was an increase in duration but not much in severity of the drug effect. As the table shows, this increase in duration of the drug effect was the most noticeable and constant change observed as the dose increased.

More dogs vomited on oral administration than on any other routes. Nine dogs in all (21%) vomited; however, 5 were among the 12 dogs in the 2 highest dosage groups (40 and 60 mg./kg.). Slight myosis occurred at all dosages above 2 mg./kg. Other effects were lachrymation and relaxation of the nictitating membrane.

An interesting difference between low and high levels is seen in the cardiac and respiratory effects; slight depression was found at 4 to 6 mg./kg. doses, whereas slight elevation was found at higher levels. At no level were there any serious cardiac, respiratory, or temperature changes, and all animals, even those on extremely high doses, made uneventful recoveries.

Intravenous Administration. Sixty-nine dogs, in 9 dosage groups, received intravenous injections of trifluomeprazine. For a quieting effect alone, 0.25 mg./kg. was sufficient. A dose as high as 1 mg./kg. produced no unwanted side effects. In fact, an extremely high dose of the drug could be given without losing the animal, although it might go into a fright stage at a dose of 10 mg./kg. or higher. Ease of handling was a characteristic of all levels of intravenous administration. There were some cardiac, respiratory, temperature, and eye changes which occurred in this series. They were not severe, however, even at highest levels of administration. Just as in oral administration, specific effects generally appeared at a certain dose level and then lasted longer at higher dosages, rather than becoming more severe. One noticeable difference from results obtained by oral administration was total absence of vomiting in the intravenous series.

At a level of 10 mg./kg., posterior paresis occurred, lasting about 45 minutes. The dogs took on a very alert and frightened appearance at this extremely high dosage, and became more irritable. Ataxia was pronounced both before and after this temporary paresis. All dogs made uneventful recoveries.

Subcutaneous and Intramuscular Administration. When given trifluomeprazine subcutaneously or intramuscularly, the dogs responded in a very similar manner to those

TABLE 1

Results of Oral Administration of Trifluomeprazine in Dogs

No. of Dogs	6	6	6	6	6	6	6
Dosage, mg./kg.	2	4	6	10	20	40	60
Onset, Min.	80	80	70	60	60	30	20
Duration, Hours	?	3	10-12	19	19	21	23
Heart rate	x+, 3 0, 3	x+, 3 x—, 3	x—, 6	x+, 6	xx+, 6	xx+, 6	xx+, 6
Resp. rate	x+, 4 0, 2	x—, 4	x—, 6	x+, 6	xx+, 6	xx+, 6	xx+, 6
Temp. drop °F.	0.4 Avg.	0	1.0 Avg.	0.5 Avg.	0.8 Avg.	1.0 Avg.	1.0 Avg.
Sedation	x	x	x	x	xxx	xxx	xxx
Myosis	0	x	x	x	x	x	x
Ataxia	0	0	0	x	xxx	xxx	xxx
Abnormal stance	0	0	0	x	x	xx	xx
Lachrymation	—	x	x	—	—	x	x
Tremors[1]	1	—	x	x	2	2	3
Relaxed nictitating membrane	—	—	x	x	x	x	x
Biting cage	2	1	2	1	—	—	—
Coprophagia	—	—	2	1	—	1	1
Vomiting	—	—	2	2	—	2	3

[1]Tremors were not serious

0 = no change
x = slight
xx = moderate
xxx = marked
+ = increase
— = decrease

treated by other routes. Rapid onset of tranquilizing effects (generally between 15 and 25 minutes) and duration of peak effect (generally between 45 and 60 minutes) make these very efficient routes of administration as compared to the oral route. They also tend to eliminate some undesirable effects such as coprophagia and vomiting.

No inflammation was found at point of injection, even in cases where the drug was injected over a period of 10 days at the same location. There did not seem to be any build-up in sensitivity to the drug when it was given each day for as long as 2 weeks. Tremors occurred in one dog at 1.5 mg./kg. and in 3 to 5 dogs at each of the higher doses but they were not serious. At all levels, the dogs were alert mentally. Mild to moderate ataxia was noted in the majority of animals at doses from 2.0 mg./kg. up. As in other routes of administration, respiratory, cardiac and temperature effects were from mild to moderate as doses increased, but they did not become marked at any level.

In a short series, trifluomeprazine given intramuscularly as a preanesthetic agent, produced good results at doses of 1.0 and 1.5 mg./kg., and the desirable effects in many cases lasted as long as 12 hours. It should be mentioned that the onset of peak therapeutic effects was somewhat slower for subcutaneous than for intramuscular administration.

Trifluomeprazine Followed by Pentobarbital. The most significant points of interest were: first, the effect of trifluomeprazine in reducing the amount of pentobarbital needed to obtain a surgical level of anesthesia; second, absence of lethal effects when full anesthetic doses of pentobarbital were given after trifluomeprazine; and third, absence of postoperative thrashing about and restlessness that ordinarily develop when pentobarbital is used.

When pentobarbital was given 10 minutes after intravenous trifluomeprazine, the following significant results were obtained: 0.125 mg./kg. of trifluomeprazine reduced by 1/3 the amount of pentobarbital needed to obtain surgical anesthesia; and 0.25 and 0.5 mg./kg. reduced by 2/3 the required amount of pentobarbital. When intravenous doses of 0.25, 0.5 and 5 mg./kg. of trifluomeprazine were followed in 10 minutes by 30 mg./kg. of pentobarbital (the usual full dose), the only significant changes were in duration of the surgical stage and duration of the depression. The life of the animal was not endangered.

Oral doses of 2 and 4 mg./kg. of trifluomeprazine made for easier handling and also had a potentiating effect on pentobarbital about equal to that of the smallest intravenous dose used, reducing by 1/3 the amount of anesthetic needed for surgical anesthesia. However, they produced a longer duration of surgical anesthesia and a longer period of depression than comparable intravenous doses.

It seemed clearly evident that absence of postanesthetic restlessness in these animals was due to lingering effects of trifluomeprazine. The dogs were very quiet but could be easily aroused.

In a special study, 3 dogs were given 40 mg./kg. of trifluomeprazine. They went into tetanic convulsions and were very sensitive to weak stimuli, but apparently were mentally alert at all times. Ten mg./kg. of pentobarbital was given to 2 of these dogs at the end of 1 hour. Twenty-four hours later, all 3 showed some effects of tranquilization, but all recovered.

Cats. Fifty-eight cats, divided into 12 groups, received various oral, intravenous, subcutaneous and intramuscular doses of trifluomeprazine. Results were very similar to those in dogs, except the doses required were much smaller and vomiting from oral doses appeared more readily in cats than in dogs. The cats were not in as good condition as the dogs, and this may account for some vomiting.

At the very high intravenous dose of 17.5 mg./kg., heart rate and respiratory rate were markedly affected, and tetanic spasms occurred; but with all other dose levels and routes of administration, the vital signs were not seriously affected. Sedation tended to be more pronounced than in dogs at corresponding dose levels.

Summary

Trifluomeprazine was administered orally, intravenously, intramuscularly and subcutaneously to 239 dogs and 58 cats. The animals were observed for any possible change in clinical behavior, body temperature, cardiac and respiratory function. Various doses were used in the different routes of administration in order to determine the amount needed for quieting effect, for preoperative sedation, for potentiation of barbiturates, and for any other conditions that might make the drug more valuable or restrict its possible use.

The drug was effective by all routes of administration. As compared to other tranquilizers, very small doses were required to produce desirable results. The drug appears to be extremely safe, as 20 to 25 times the therapeutic dose failed to kill any dogs or to produce serious cardiac or respiratory depression. In fact, it seemed to stimulate activity of the latter systems. It can be used for quieting; it aids in handling animals; it reduces the amounts of barbiturate needed for surgical anesthesia and reduces anesthetic excitement during induction and recovery from anesthesia. Finally, there seems to be no danger if a full dose of barbiturate is accidentally given following trifluomeprazine.

Otitis Therapy in Small Animals: Clinical Report

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A major facet of small animal medicine is the treatment of acute and chronic otitis externa. The extent of this problem can be related to the numerous articles published each year describing a wide range of medicaments and surgery with topical therapy for this condition. Careful study of the technic in almost all instances revealed the common denominator of treatment to be a thorough cleansing of the ear canal. Once this was accomplished, most otitis cases responded favorably without further medication. However, later work has shown that there are cases of otitis externa which are the result of fungi and yeasts residing deep in the ear canal.[1,2] These invaders cause a constant secretion of foul-smelling, ceruminous material, and fail to respond to any of the antibiotics presently available. It is with this in mind that the author investigated and evaluated the use of an otic preparation for the treatment of otitis cases which had not responded to previous treatment (Fulvidex Otic Suspension, Schering Corp.). In addition to griseofulvin, the formulation contains undecylenic acid, dexamethasone,

nitrofurathiazide, which is an antimicrobial agent, and an anesthetic, all suspended in a peanut oil base. The following 5 case reports are a selected cross section of many cases treated with this product.

CASE NO. 1: A 9-year-old female cocker spaniel had a history of chronic otitis externa for several years. The entire right ear canal was completely raw and ulcerated. Treatment was started on October 10, 1960 with the griseofulvin suspension, one dropperful daily for 5 days. At the end of 5 days the ear was much better, but sensitive to touch and it still showed some ulcerated areas. More of the product was dispensed and the owner reported approximately 3 weeks later that the ear was in excellent condition. There was absence of pain, with no shaking or scratching. The owner was pleased with the results.

CASE NO. 2: A 6-year-old male Brittany spaniel had been troubled with chronic otitis for over 2 years. The dog had been treated repeatedly but the condition was recurrent. There was extreme ulceration of the left ear with suppuration. The right ear showed irritation but no ulceration. Previous treatment had consisted of cleaning with alcohol. Treatment with griseofulvin suspension was instituted on October 6, 1960 at a dosage of 1 dropperful in each ear daily. After 10 days the infection and inflammation were sufficiently reduced to allow a bilateral Lacroix operation to be performed. The operation to date has been successful, with no recurrence of infection.

CASE NO. 3: A 3-year-old male poodle was presented for the first time on November 3, 1960. Both ears were full of wax and hair. Following removal of the wax and hair, ulcerations were found throughout the canal. The ulcers were cauterized and griseofulvin suspension instilled with a follow-up treatment of 1 dropperful daily. On December 10th, the ears appeared better but not completely healed. More medication was dispensed and by December 26th, the ears showed no evidence of infection.

CASE NO. 4: This 3-year-old female cocker spaniel had been treated for 2 months by another veterinarian for otitis in the right ear. The left ear at this time was acutely infected and the right ear showed a chronic infection. Both ears contained blood, wax, serum and pus. The ears were cleaned and the ulcers cauterized. Griseofulvin suspension was instilled on December 30, 1960, with instructions to the owner to put 1 dropperful in the left ear daily. On January 7, 1961, the dog showed remarkable improvement, with no evidence of inflammation or ulceration. At that time a small plug of ear wax near the ear drum was removed. A supply of the preparation was dispensed with instructions to use ½ dropperful daily in each ear until the supply was exhausted. The owner called on January 20, 1961 to report that the ears were well healed.

CASE NO. 5: A 5-year-old male poodle was presented with a history of chronic otitis for 2 years or more. The ears were ulcerated and showed a thick brown discharge. Profuse hair growth in the external canal aggravated the condition. The dog had previously been treated with other medication. A bilateral Lacroix operation was performed on September 13, 1960, which resulted in considerable improvement but did not completely clear the condition. On December 19, 1960, treatment with griseofulvin suspension was initiated, 1 dropperful daily. On December 29, 1960, the owner reported that the ears were clear and clean for the first time in 2 years and that he wanted to continue the use of the medication as a prophylactic measure.

In these investigations, Fulvidex Otic Suspension showed remarkable results for treatment of long-standing cases of otitis externa and proved to be of great therapeutic value in acute cases. Even cases of otitis externa which were not cured were much improved and continued use of the product allowed the animal to live comfortably.

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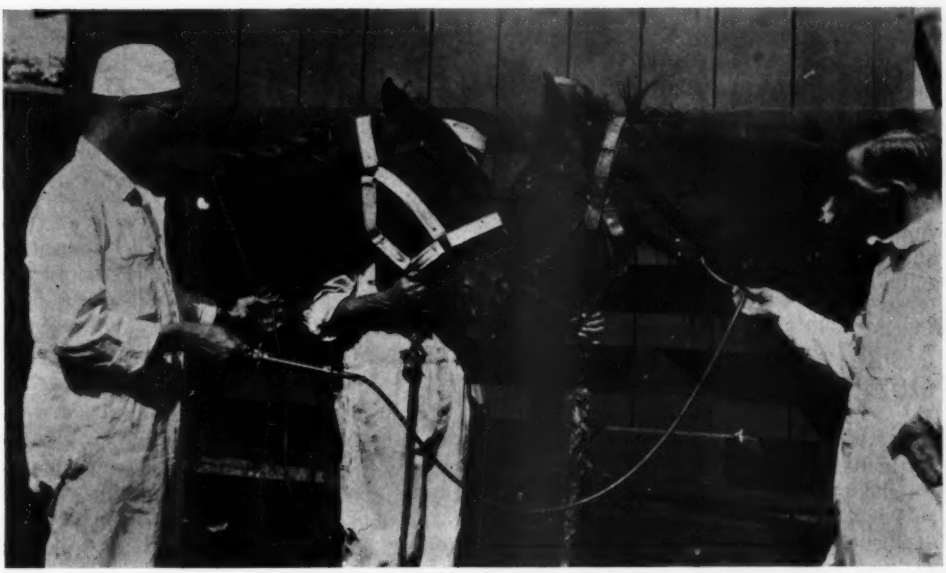
Observations and notes on equine practice gleaned from 40 years of veterinary experience by A. H. Quin, D.V.M.

A Technic for Blood Transfusion

In any number of cases encountered in equine practice, transfusion of whole blood is possibly the best single treatment. Handled properly, it does not have to be a messy, sticky procedure. Here is a practical approach that will work well if followed to the letter.

Fit a slip adaptor to the end of 2 lengths of rubber tubing 5 to 6 feet long and a 14-gauge 2-inch needle to each adaptor. Place the open end of one rubber tubing on the outlet and the open end of the other rubber tubing on the inlet of a standard 40 cc. Shikles automatic vaccinating syringe. Now you have an automatic syringe fitted with one tube with needle attached for the donor and the other tube with needle attached for the recipient. Before starting the transfusion, rinse the syringe and tubing by pumping through some 5% sodium citrate solution. This places a glaze on the inner linings so that blood will not adhere and clot.

Stand the donor and recipient horses side by side about 1 yard apart. Insert the needles in the jugular vein of each horse. Start pumping the syringe (about one syringeful per minute) until the desired amount is given. When the operation is complete, irrigate the syringe and tubing with soapy water and rinse with alcohol.



Use of the Twitch

Adequate restraint is a prerequisite of good equine practice. The twitch is the most important restraining device.

The best twitch comprises a hardwood handle, 1 to 1½ inches in diameter by 36 to 40 inches long, equipped with a loop of braided nylon. The loop should be just broad enough to fit your fully spread hand at mid-finger.

Pull the twitch hand down the side of the face and apply the twitch quickly, firmly and gently. Most definitely, the idea is not to amputate the lip by torsion. Allow a little leeway so you can tighten down as indicated.

When it is necessary to pass a stomach tube on a touchy horse or inspect the nares, twitching the lower lip is equally effective.

Nutritional Ophthalmia

Not all ophthalmia of horses is of the periodic or moon blindness type. When horses are stabled over long periods of time and receive only cured or brown hay and seed grains without yellow corn, obscure lesions of the eyes related to vitamin A deficiency may develop. Night blindness may occur before any visible ocular changes can be noted. Excessive lacrimation, variable cloudiness of the cornea without xerophthalmia, slight irritability and increased nervousness are characteristic.

Except in advanced cases, ophthalmia due to avitaminosis A is reversible when treated with 500,000 units of injectable vitamin A, supplemented with high grade alfalfa leaf meal and one of the vitamin A and D feed additives.

Nonsurgical Treatment Of Poll Evil

Numerous references of the past 25 years incriminate *Brucella abortus* as an etiological factor in equine fistulous withers and poll evil. Destructive changes involving the ligamentum nuchae are consistently present. Almost all affected horses will show a positive reaction to an agglutination test.

Nonsurgical treatment of fistulous withers and poll evil is possible by a series of Strain 19 Brucella vaccine injections. For an average-sized horse, the dose is 8 cc., preferably injected vertically into the pectoral muscles by splitting the dose (2 cc. at each injection site). The owner should be warned that a measure of risk is involved, for both a local and a systemic reaction is to be expected. The dose is repeated at 10-day intervals until 3 or 4 injections have been given.

Cervical injection should be avoided. If a cold abscess occurs at the pectoral site, vertical drainage is accomplished easily.

Practice Tips

A little memory refreshing may be in order for veterinarians who only occasionally treat horses. The normal rectal temperature of adult horses is from 99 to 100.8 F. The normal resting pulse rate varies with age. From birth to one month of age, 70 to 90 beats per minute; 6 months of age, 60 to 71; yearlings, 50 to 68; full adults, 36 to 57. Thoroughbreds will be a bit faster, an average of 38 to 45 beats per minute. The resting respiratory rate ranges from 8 to 16 per minute, with an average of 12 to 13.

Excessive accumulations of smegma in the urethral diverticulum of geldings cause foot stamping, erratic back kicking, pointing the nose at the groin and sometimes symptoms of colicky pain.

The diverticulum should be emptied with the rubber gloved hand, thoroughly irrigated with a soapy detergent solution, and given a final rinse of 1:3 diluted hydrogen peroxide.

At least 50% of the winter bot crop in horses can be reduced if the groom will sponge shoulders and front legs of horses twice a week with warm water containing one oz. of Creolin per gallon during months of late summer and early fall.

Vaccination of Pregnant Cattle with Infectious Bovine Rhinotracheitis Vaccine

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Serologic evidence indicating that both infectious bovine rhinotracheitis (IBR) and bovine virus diarrhea (BVD) are widely disseminated in beef and dairy cattle in this country has recently been reported.[1]

Infectious bovine rhinotracheitis has been recognized as a disease entity for several years and first appeared as a serious clinical problem in feedlots in the Intermountain West. The clinical manifestations of IBR infection vary; rhinotracheitis, vaginitis, conjunctivitis and abortions have been observed in spontaneous outbreaks.[2-5] The clinical course in field cases of the respiratory form is usually 2 to 7 days and abortions characteristically occur early during the acute, febrile stage. The development of a modified live virus vaccine (Rhivax, Pitman-Moore Co.) for IBR was reported in 1956.[6] Controlled field trials[7-9] showed the vaccine was safe and effective, and vaccination is now used to control IBR in beef cattle and dairy herds.

Bovine virus diarrhea, which may sometimes be confused clinically with IBR, was first described by Olafson, *et al.*[10] in 1946 in New York State. Clinical manifestations include stomatitis, gastroenteritis, laminitis and abortions. Baker, *et al.*[11] reported abortions associated with BVD occurred from 10 days to 3 months following initial infection. Evidence obtained by this laboratory in studying material from field cases supports this observation.

Abortions following vaccination with certain IBR vaccines were first brought to our attention in January, 1961, when specific requests were received for laboratory assistance in field cases of this nature. In most of these instances, no laboratory studies to establish a definitive diagnosis, or at least to eliminate as many specific causes of abortion as possible had been conducted. In view of the circumstantial association of some abortion episodes with IBR vaccination, and the concern this had aroused in some cases, a survey was made to obtain as much documented field information as possible concerning the use of IBR vaccines in pregnant cows. The results, which appear to have considerable significance, are reported here.

Collection of Data

Material from field cases is accepted for study in this laboratory only upon referral of a veterinarian who, in turn, is sent

the report of results. Permanent records of all such cases are kept on file at the laboratory and, by means of a punch card system, various types of records can be rapidly sorted and reviewed for analysis.

For several years, serum samples submitted for study from affected cows in herds with abortion problems have been routinely tested for antibodies against *Leptospira pomona, Vibrio fetus* and *Brucella abortus*. In the past few years, serologic tests in bovine kidney tissue culture for viral antibodies have been added: IBR in 1959, and BVD and SF_4 (parainfluenza-3) during 1960. The parainfluenza-3 test is the most recent and is used less frequently. In cases in which aborted fetuses were submitted, records also include information on the results of histopathologic studies, and tests to recover and identify viruses and bacteria.

Records for 1959-1961 were reviewed, and herds selected for the present investigation on the basis of results of routine serologic tests of representative cattle in the herds. Additional selection was made on the basis of evidence suggesting there were pregnant cows in the herd at time of vaccination against IBR.

A form questionnaire was then prepared to obtain additional and follow-up information. The first part of the form contained the herd owner's name and address, dates of serologic tests, number of animals tested, and number positive or negative for IBR, BVD, or SF_4 (parainfluenza-3) antibodies. Each questionnaire was sent to the referring veterinarian with the request that he complete, sign and return the form to the laboratory. Information requested included number of cattle in the herd, whether beef or dairy cattle, number clinically ill, number of deaths; whether they were vaccinated for IBR and, if so, on what date; how many were pregnant at vaccination, and whether specific clinical symptoms, including abortions, were present before and after vaccination. The form provided for identification of IBR vaccine as Rhivax or other; thus Rhivax was the only vaccine specifically identified in the completed forms.

Of 229 forms mailed to 120 veterinarians, 190 were returned, and 61 contained information which could be applied to this study. In evaluating the results of vaccination, only those herds in which Rhivax was used were considered, since this is the only vaccine on which complete information is available to the authors. Data on pregnant cows were returned from the states of Georgia, Illinois, Iowa, Mississippi, Missouri and Nebraska.

TABLE 1

Classification of Herds in which Pregnant Cows Were Vaccinated with Rhivax

Group	Type	Number of Herds	Number Pregnant Cows Vaccinated	Diagnosis
I				
No abortions pre- or post-vaccination	Beef	13	722	
	Dairy	21	526	
	Mixed	2	31	
		36	1,279	
II				
Abortions pre-vaccination; none post-vaccination	Beef	1	90	IBR
	Dairy	2	180	1 herd, IBR
		3	270	1 herd, IBR and BVD
III				
Abortions post-vaccination	Beef	1	37 (6 abortions 14-70 days post-vacc.)	BVD
	Dairy	1	30 (5 abortions 60-120 days post-vacc.)	BVD
	Mixed	1	35 (1 abortion 17 days post-vacc.)	BVD
		3	102 (12 abortions)	

Results and Discussion

The herds in which pregnant cows were vaccinated with Rhivax were classified into 3 categories as shown in Table 1. Group 1, with a total of 1,279 pregnant cows, consisted of 36 herds in which abortions were not observed either before or after vaccination. Group 2 consisted of 3 herds with 270 pregnant cows; abortions associated with IBR (2 herds) or IBR and BVD (1 herd) ceased in these herds after they had been vaccinated with Rhivax. Group 3 consisted of 3 herds, with 102 pregnant cows, in which a total of 12 abortions occurred between 14 and 120 days after vaccination with Rhivax.

Herd 1: This herd had 35 pregnant cows of mixed dairy and beef breeds. Diarrhea developed in the herd and 1 abortion occurred 17 days after the herd was vaccinated. Subsequent serologic tests on the cow that aborted and one other cow with diarrhea revealed IBR titers of 1:10 in each, a relatively low titer which is within the expected range after vaccination. By contrast, the BVD titers were approximately 1:600 in the aborting animal and 1:150 in the other. The titers and the clinical signs both suggest BVD as the cause of abortion. Moreover, histopathologic examination of intestine and mesenteric lymph nodes submitted from a fatal case revealed changes compatible with BVD infection, namely, inflammation of the mucosa with inflammation and necrosis of the lymphoid tissue, including the Peyer's patches.

Herd 2: There were 30 pregnant dairy type cows in this herd. At the time of vaccination with Rhivax many of the cows in the herd were clinically ill with mild diarrhea. Five abortions occurred between 60 to 120 days following vaccination. Serologic tests for antibodies against *L. pomona*, *V. fetus* and *B. abortus* were negative, whereas results were positive for IBR and BVD at the screening dilutions of 1:2 and 1:10 respectively. While sufficient serum was not available for the determination of IBR-BVD endpoints, on the basis of clinical evidence (mild diarrhea with no evidence of respiratory difficulty, and long interval before abortions occurred), the abortions appeared to be due to BVD and not associated with IBR vaccination.

Herd 3: Six abortions occurred from 14 to 70 days post-vaccination among the 37 pregnant beef type cows in this herd. No other signs of clinical illness were observed in the herd.

Several attempts made in bovine kidney cell cultures to isolate a virus from the organs of an aborted fetus were unsuccessful. Since IBR virus propagates readily in such tissue cultures, it may reasonably be assumed that this virus was not present in the tissues. Histopathologic examination of the fetal organs revealed many small necrotic foci with numerous neutrophils in sections of the liver, and a periportal lymphocytic infiltration. Similar hepatic lesions were described by Rooney[12] and by Carlson, *et al.*[13] from what it is now generally agreed were field cases of BVD. That BVD was the cause of the abortions in this herd is suggested by the long period between vaccination and abortions, the absence of clinical manifestations, failure of attempts to recover IBR virus from the fetus and histopathologic changes in the liver of the fetus.

Results of serologic studies in 18 unvaccinated herds involving 2,782 cows are shown in Table 2. Paired serum samples from some of the aborting cows made it possible to determine the status of a given agent more precisely in any particular herd. A rise in antibody titer during the period between bleedings was interpreted as an indication of active infection. All samples were screened for antibodies against com-

TABLE 2
Clinical and Serological Diagnoses of Abortions in Unvaccinated Cattle

Diagnosis*	Number of Herds	Number of Cows
IBR	3	724
BVD	6	458
IBR and BVD	7	680
IBR and *L. pomona*	1	850
BVD and Parainfluenza-3	1	70
	18	2,782

*With the one exception indicated, samples from all herds were negative for *B. abortus*, *L. pomona*, and *V. fetus*.

mon abortive agents, (*B. abortus, L. pomona, V. fetus,* IBR and BVD) and many samples were also tested for antibodies against SF_4 virus. On the basis of these results and the clinical histories, the abortions in 3 herds were attributed to IBR alone and in 6 herds to BVD alone. Evidence of dual infections was observed in 9 herds: 7 herds with IBR and BVD, 1 herd with IBR and *L. pomona,* and 1 herd with BVD and SF_4.

Abortions associated with IBR and BVD infections have been recognized clinically for several years. The evidence reported here supports field impressions that BVD is the more important entity. In contrast to abortions resulting from BVD infection, which usually occur between 10 days and 3 months or longer after clinically mild illness, abortions associated with IBR infection appear to occur no later than 7 days after onset of symptoms and usually while the cows are clinically ill.

Correlation of clinical signs with results of laboratory examinations provides a means for establishing a definitive or probable diagnosis in many field outbreaks. The data reported here illustrate the importance of complete laboratory studies in connection with abortion problems. Often a definitive diagnosis is possible with the aid of serologic, histopathologic, and other laboratory studies. On the other hand, if a diagnosis is not possible, certain common causes of abortion, such as *B. abortus, L. pomona,* and *V. fetus,* can at least be eliminated from consideration. Failure to make use of laboratory facilities for study of such problems may well result in erroneous interpretations, unsuccessful control programs in the field, and dissemination of misleading information. Moreover, it is apparent from data reported here that an accurate diagnosis in cases of abortion due to IBR and BVD infection would tend to clarify many of the problems in which the diagnosis has heretofore been doubtful or obscure.

Summary

Data from 39 herds in 6 states show no postvaccination abortions occurred in a total of 1,549 pregnant cattle vaccinated with a modified live virus infectious bovine rhinotracheitis vaccine (Rhivax). In 3 of these herds abortions associated with IBR (2 herds) and IBR and BVD (1 herd) occurred before vaccination. In 3 other herds, in which abortions did occur some time after vaccination with Rhivax, laboratory and clinical data indicated that BVD infection was the cause of abortions in each case. Serologic and clinical evidence of IBR or BVD infection as the probable cause of abortions was obtained in 18 herds that had not been vaccinated against IBR.

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Acknowledgments: To the Allied field representatives, practicing veterinarians, Mary Lou Alter, Rubie Lindley and Dr. Karl Mayer.

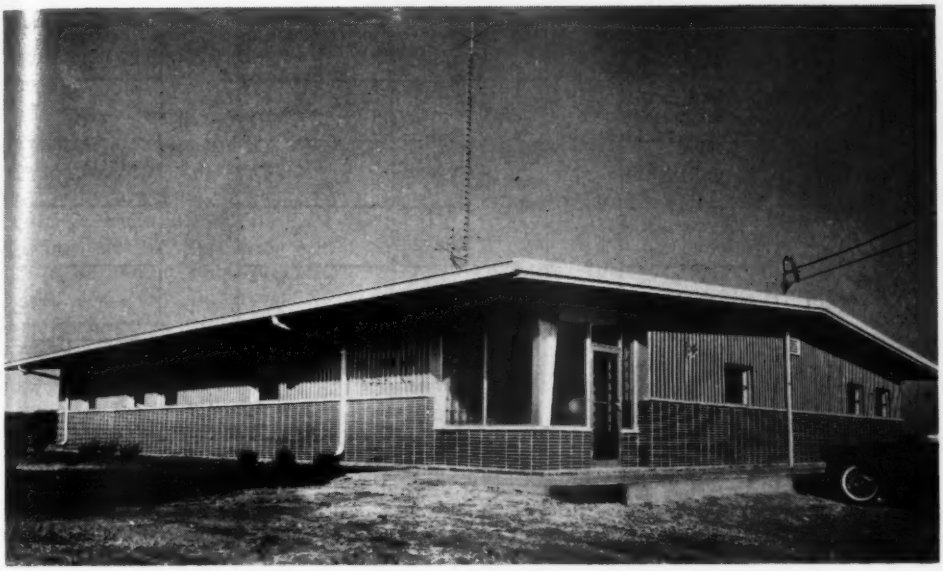
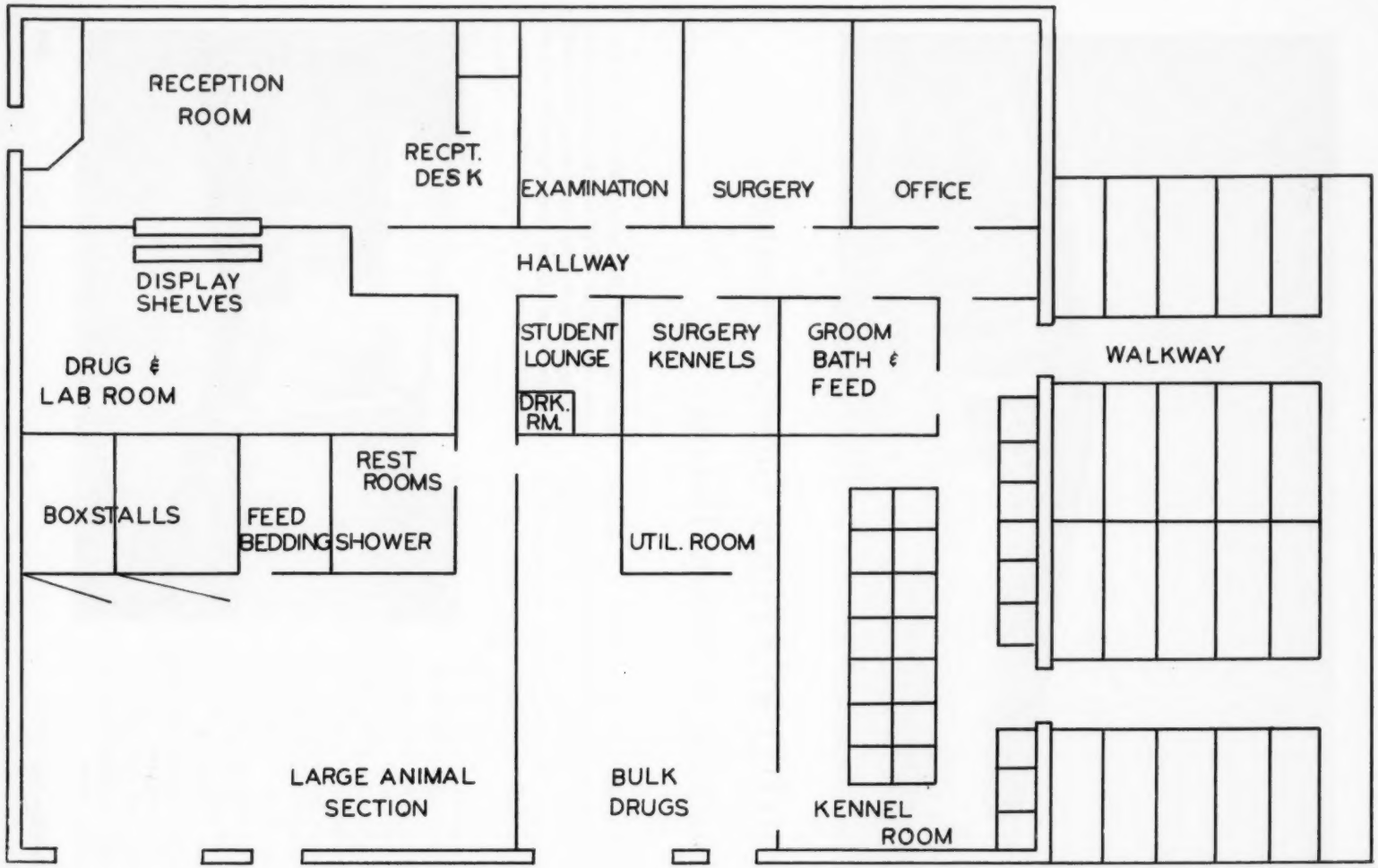


PHOTO FEATURE: General Practice Hospital at Dixon, Illinois

The Dixon Veterinary Clinic is a modern, steel frame structure located one mile west of Dixon, Illinois on Alternate U. S. Highway 30. This new facility was erected to aid Drs. Clay R. Collins, Frank F. Densmore and James Collins in providing better veterinary service in the rich agricultural area in which Dixon (population 18,000) is located.

The photograph at top shows the front of the clinic facing the highway. The exterior is constructed of a 4-foot high red brick base backed by concrete block and above this insulated double-layered 26 gauge vinyl aluminum coated Stran steel. The sides are a mist green color with white roof and trim. At right the reception room is pictured. Floors here and in hallways are rubber-tiled.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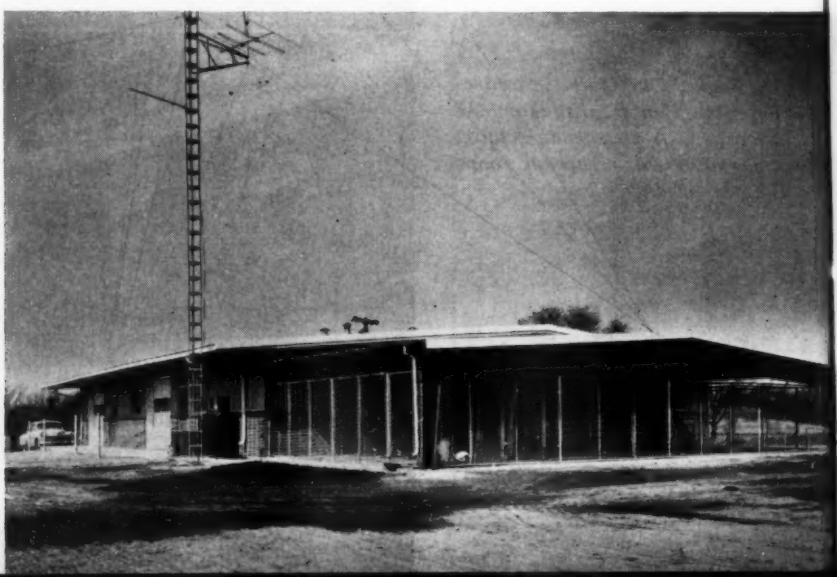
WALKWAY
REST ROOMS
BOXSTALLS
FEED BEDDING
SHOWER
UTIL. ROOM
LARGE ANIMAL SECTION
BULK DRUGS
KENNEL ROOM

This steel structure provides durability and low upkeep with a neat, pleasant appearance. Inside walls are painted concrete block. Overall dimensions of the building are 60.2 feet wide and 74.4 feet long. This provides ample space in all areas. All rooms except the large animal section and bulk drug room have acoustical ceilings. Vinyl tile floor covering is utilized in all areas except the large animal section and where rubber tile is used. Two heating plants keep undesirable odors from the main section of the building. One heating plant with a central air conditioner serves all rooms except the large animal section, kennels and bulk drug room. The kennels have a room air conditioner. All areas are provided with intercommunications.

Top photo is the examination room. Center, drug room and laboratory. A dispensing counter opens into the reception room. Bottom, surgery.

Photo Feature . . . Dixon Veterinary Hospital

The kennel room is 17 by 28½ feet with 45 inside pens. These pens are constructed of 4-inch spectra glazed tile partitions and concrete floors with a 2-inch trough in front. The doors are steel. Pens on the bottom tier are 33 by 36 inches and those on the top tier vary from 27 to 33 by 36 inches. In addition there are 15 cages in a surgical recovery room located across the hall from the surgery room. There are 20 covered outside exercise runs. Each run is 4 by 10 feet. A 7-foot Mason fence is used to enclose the runs.



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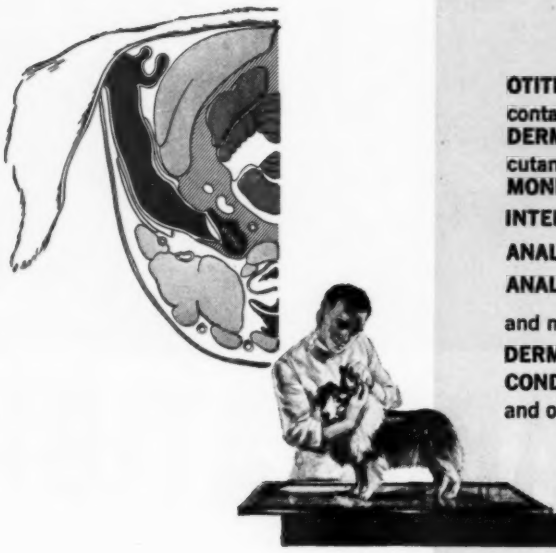

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Notes and abstracts screened from the medical literature for their special interest to veterinarians by Lynn Stratton Morris.

Adrenal Insufficiency in Postmature Calves

Postmature Holstein-Friesian calves have adrenal insufficiency, varying in degree and manifestation, with the extreme insufficiency producing hyperthyroidism. This syndrome is genetically conditioned and occurs in the postmature Holstein-Friesian calf irrespective of gestational age.

Studies on postmaturity in the Holstein-Friesian breed led to the foregoing conclusions as reported by Louis W. Holm, Ph.D., Harold R. Parker, D.V.M., and Sylvia Jean Galligan, B.A., of the School of Veterinary Medicine, University of California, Davis.

Five postmature Holstein-Friesian calves delivered by cesarean section and treated with hydrocortisone immediately after presentation were compared with 2 normal calves also delivered by cesarean section. Adrenal insufficiency was found in all postmature calves and severe thyrotoxicosis in 3 of the 5, with a lesser hyperthyroidism in the 2 remaining cases.

The diagnosis of postmaturity in the 3 bull and 2 heifer calves was made on the basis of known insemination date of the cows, the known heterozygosity of the bull and 4 of the cows for the gene that determines gestation length, the pedigree of the fifth cow and the characteristic lack of maternal preparation for parturition in all of the cows.

All calves had the body conformation and characteristics of postmaturity: heavy skeleton, weak quadriceps muscles and a lack of gag, cough, swallowing and suckling reflexes. There were varying degrees of staining of the hair coat with meconium. Three of the 5 calves were severely stained. In 2 cases, from identical matings, the volume of amniotic fluid was above normal.

All 5 animals in this study lived for varying periods of time. Calf 409 was placed in pasture when he was 5 months old. Sperm was first found at 8 months. After 11 months the animal was used for breeding. Libido was good. One cow conceived from this breeding and subsequently bore a postmature calf. At 14 months the animal underwent a sudden collapse and died the next day. Calf 410 collapsed at 2 months and died within 4 hours. Calf 411 died on the 4th day. Calf 422 died on the 25th day and Calf 424 on the 15th day.

The investigators suggest that the adenohypophysis, smaller than normal and exhibiting degranulation of the acidophil cells, may be the prime defective organ, the hypoadrenalism resulting from inadequate or deranged drive by the pituitary gland.

Although the relationship between adrenal insufficiency of the fetus and the genetically conditioned prolonged gestation is unknown, the constancy of this relationship may provide a clue to the disturbed preparturient physiology of the cow.

Present indications are that the gene in question is a recessive factor and that the length of gestation is determined by maternal and fetal genotype interactions. The investigators also explained that a cow

heterozygous for the gene in question and bred to a bull heterozygous for the gene may have a normal pregnancy followed by an abnormal one. She may have several normal pregnancies or she may have consecutive abnormal pregnancies. The critical factor appears to be the genotype of the fetal organism.

Am. Jour. Ob. Gyn., 81:1000-1008
May, 1961

Advantages of Cooled Barium Suspension

Barium suspensions for roentgenologic examination of the colon, prepared at 41 F. (5 C.) rather than at the commonly used body temperature, possess many advantages, according to Dr. George Levene of the Department of Radiology, Boston University-Massachusetts Memorial Hospitals Medical Center, Boston.

After use in several thousand cases, this method has proved to offer these advantages: (1) Less hyperemia and therefore less irritability are produced. (2) The mild anesthetic effect of the colder suspension raises the threshold of excitability. This results in better and more comfortable retention of the enema. (3) Tonic contraction of the anal sphincters is stimulated, contributing to the ease of retention. (4) Relaxation of the colon, caused according to the law of reciprocal innervation, permits quicker flow of the enema with less tenesmus and discomfort to the patient. (5) There is reduction of the tendency to bubble formation of the air or carbon dioxide used in double-contrast examinations, since all gases are more soluble in cold than in warm liquids.

Radiology, 77:117-118
July, 1961

Scrapie Transmitted To Swiss Mice

A degenerative disorder of the central nervous system has been observed in one of three breeds of mice inoculated with the drowsy type of scrapie brain material. There have been no previous reports of successful transmission of scrapie to laboratory animals.

The first symptoms definitely suggesting neurological involvement were seen in one mouse 7½ months after inoculation. In the next 6 weeks, 7 more mice showed similar symptoms. All 8 were weaned Swiss white mice inoculated with the drowsy type of scrapie brain. In this group, 20 mice were originally inoculated and 12 had survived when the first case showed neurological symptoms. Thus of the 12 surviving mice, 8 have shown these symptoms; of the 4 others, 1 died and was unsuitable for examination and 3 are suspect and still under observation.

The symptoms suggested disorder of function of the motor nerves, especially those associated with the hind quarters and tail. Histological examination of the brains of affected mice, conducted 2 weeks after the symptoms first were noted, revealed constant abnormalities, with lesions resembling those of scrapie.

The Lancet, 1:1378-9
(June 24) 1961

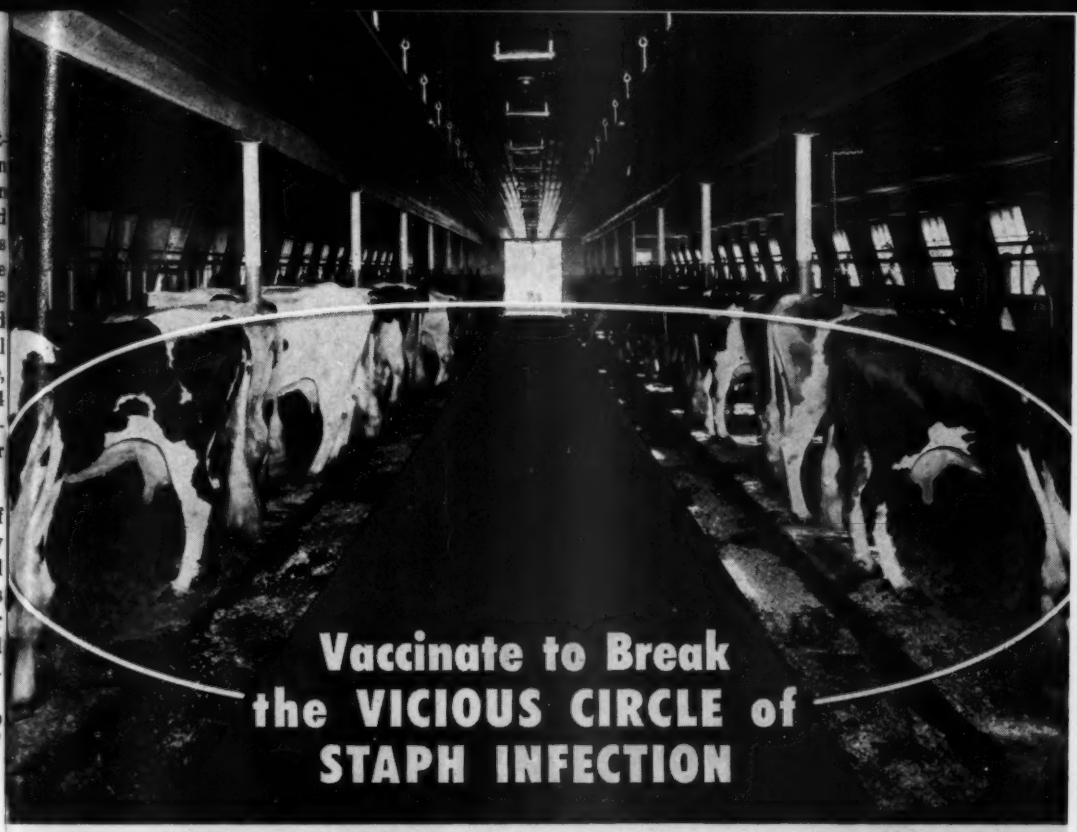
Niacin Test Differentiates T.B. Strains

Satisfactory use of the niacin test to distinguish between human and bovine strains of tubercle bacilli has been reported by Drs. L. F. Bojalil and F. Bastarrachea of Mexico City. Corroboration of the results was obtained by inoculating the strains in various species of animals.

The test was originally announced by K. Konno of Japan as a way to differentiate between tubercle bacilli and unclassified mycobacteria, the distinguishing factor being that human strains of the tubercle bacilli produce greater amounts of niacin (nicotinic acid) in culture medium than do the unclassified organisms.

Both human and bovine strains are known to be virulent for guinea pigs, but the human is not virulent for rabbits while the bovine is. The Mexican investigators state that 141 strains positive by the niacin test were highly positive for guinea pigs but not for rabbits, while 3 niacin-negative strains were virulent for both guinea pigs and rabbits.

Am. Rev. Resp. Dis., 84:272-275
August, 1961



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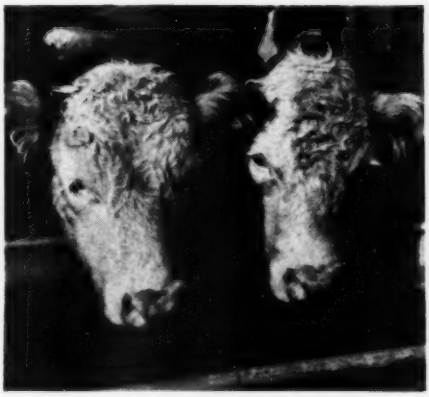

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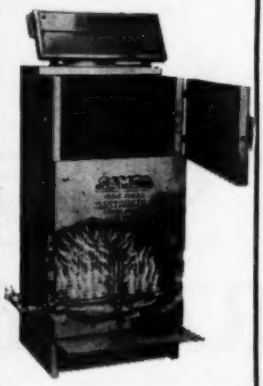

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Veterinary Calendar

Oct. 1-4. **New England Veterinary Medical Association,** annual meeting. Poland Spring Hotel, Poland Springs, Maine. Dr. Louis E. Denton, Houlton, Maine, president.

Oct. 5-7. **Purdue University,** 49th Annual Conference for Veterinarians. School of Veterinary Science and Medicine, Purdue University, Lafayette, Ind. Erskine V. Morse, dean.

Oct. 12-13. **Interstate Veterinary Medical Association,** 47th annual meeting. Sheraton-Martin Hotel, Sioux City, Iowa. Dr. D. W. Rubel, secretary.

Oct. 12-13. **Eastern Iowa Veterinary Association,** 48th annual meeting. Sheraton-Montrose Hotel, Cedar Rapids, Iowa. W. R. Goodwin, Newhall, Iowa, secretary.

Oct. 19-20. **University of Illinois,** 42nd annual conference and extension short course, College of Veterinary Medicine, University of Illinois, Urbana. L. E. St. Clair, chairman.

Oct. 22-25. **Southern Veterinary Medical Association,** 44th annual convention. Thomas Jefferson Hotel, Birmingham, Ala. S. Allen Price, Birmingham, Ala.

Oct. 23-25. **California Veterinary Medical Association,** 73rd annual convention, Lafayette Hotel, Long Beach, Calif. Kenneth Humphreys, 3004 16th St., San Francisco, executive secretary.

Oct. 28. **Junior American Veterinary Medical Association,** Kansas State student chapter, 5th annual Veterinary Medicine Open House, Kansas State University, Manhattan, Kansas.

Oct. 30-31. **University of Missouri,** 37th annual veterinary conference. University of Missouri, Columbia, Mo. Cecil Elder, chairman.

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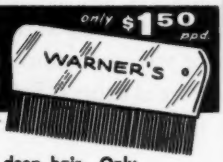

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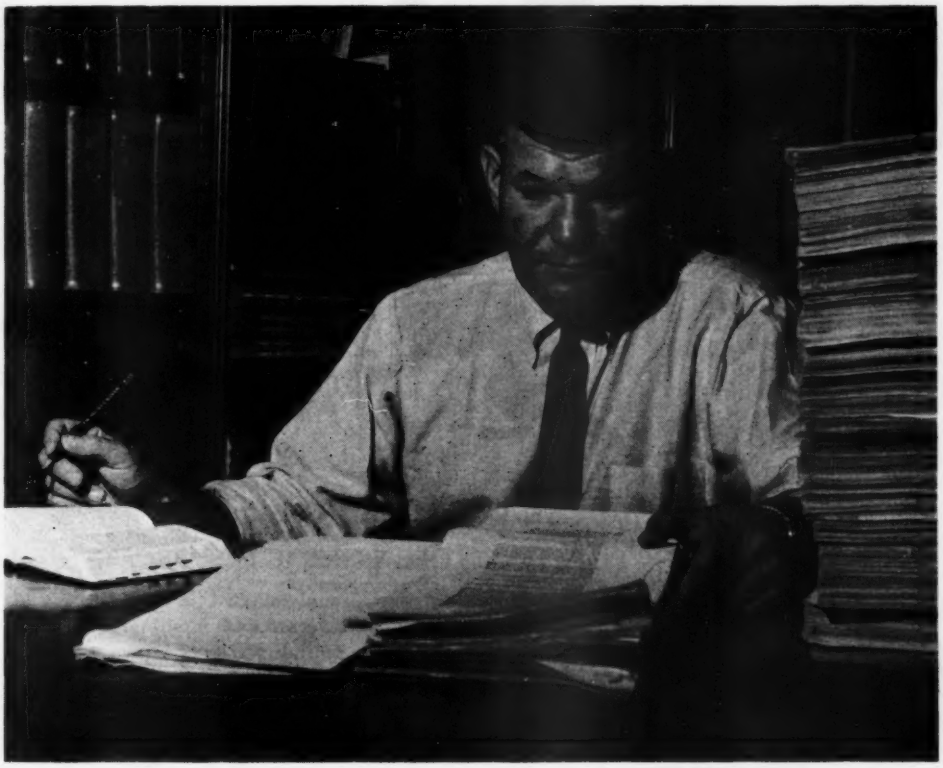
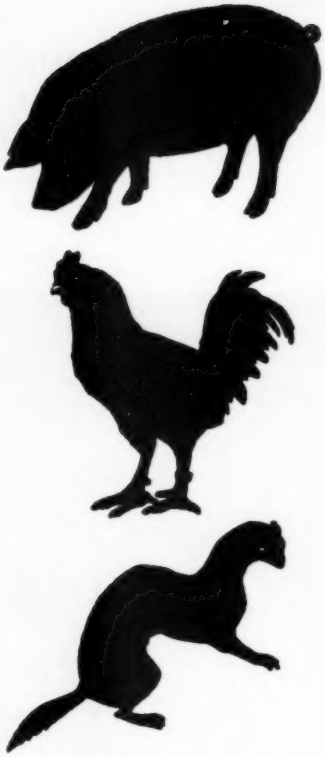
Practice Management and Veterinary News Section



Dr. O. H. Siegmund, editor of The Merck Veterinary Manual, hard at work. The second edition, representing thousands of hours of editorial endeavor has just been completed. VM salutes Dr. Siegmund, his staff and Merck & Company for this valued nonprofit contribution to veterinary literature. Dr. Siegmund has worked with hundreds of authorities in every field pertaining to animal sciences in his eight years as editor. The selection of the portion of the great mass of information that should be included is based on the usefulness to the practitioner. A broad background of research and practice has been valuable for this difficult editorial assignment.



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Results of VM News Digest Fee Poll

A total of 146 veterinarians representing 37 states and Canada have submitted estimated fees on the 18 services in the fee poll presented in the July 25th VM NEWS DIGEST. Reports are still being received. This poll was not intended to provide scientifically reliable data but rather to reflect any geographical trends or patterns there might be by a simple arithmetic average. Extreme highs or lows were not removed. All questions were not answered by each respondent and the averages represent those who answered that particular question.

National Fee Poll Tabulations and Regional Averages

Service	No. of Replies	High	Low	National Average	North East	North Central	South	West
1. Home Calls	99	15.00	3.00	6.72	7.10	6.24	4.98	6.64
2. Office call during hours, no drugs	110	8.00	2.00	3.21	4.00	2.91	2.65	3.48
3. Office call after hours, no drugs	109	20.00	2.00	5.92	6.11	5.18	5.07	7.41
4. Ambulance pick-up	71	10.00	1.00	4.15	4.32	4.28	3.75	4.29
5. Board per day	108	3.00	1.00	1.12	1.87	1.53	1.27	1.45
6. Bath—routine	116	5.00	2.00	3.25	3.77	3.35	2.74	3.69
7. Bath—special	103	10.00	1.50	4.50	5.29	4.39	3.80	4.71
8. Clip Cocker w/o bath	89	12.00	3.00	5.49	6.35	5.57	4.69	5.32
9. Clip all over w/o bath	98	12.00	3.00	5.75	6.76	1.16	4.96	5.55
10. Clip Poodle w/o design	76	17.50	3.50	8.44	8.66	8.97	7.78	8.53
11. Clip Poodle w/ design	72	15.00	5.00	9.08	9.79	9.84	7.93	9.22
12. Tick Dip or Treat	98	20.00	1.00	4.53	5.18	5.61	3.05	4.67
13. Nail Trim	104	3.00	.50	1.27	1.74	1.11	1.01	1.33
14. Rabies Vaccination	109	5.00	1.50	3.61	4.64	3.55	2.75	3.78
15. Rabies Observation per day	106	4.00	1.00	7.91	2.12	1.72	1.54	1.88
16. Rabies Lab. Exam. of brain	37	25.00	3.00	10.54	10.90	10.54	9.08	12.00
17. Distemper Canine Serum	114	5.00	1.00	3.12	3.68	2.93	2.65	3.40
18. Distemper Canine Vaccination	120	18.00	5.00	10.46	10.60	11.26	8.93	11.02

North Eastern states include Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware and Maryland and are based on answers to each question from this area.

North Central states include Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa Missouri, North Dakota, South Dakota, Nebraska and Kansas.

Southern states represent Virginia, West Virginia, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Arkansas, Louisianna, Oklahoma and Texas.

Western states include Montana, Wyoming, Colorado, New Mexico, Arizona, Utah, Idaho, Nevada, California, Oregon and Washington.

Partnership Agreements

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From the legal viewpoint, partnerships are a dangerous form of business unit. It is a mutual reciprocity agent to which there is no limit to the personal liability that might attach. Each member of the partnership is the agent of the other. If an insolvent veterinarian commits an act of malpractice, a financially sound partner could be assessed for the total loss. Partners should be carefully chosen!

The partner liability, however, extends only within the scope of the partnership. That is, a veterinarian is not responsible for the acts of a partner outside the legitimate scope or limit of the partnership, should the partner perform a wanton or willful act which would not be countenanced or ratified by the reasonable partner. The members of a partnership are jointly liable for acts of omission or commission (malpractice) of the others within the terms of the partnership.

The partnership agreement may be a sliding scale for the apportionment of income; protection for the older veterinarian against the younger breaking away at an inopportune time and setting himself up as a competitor; perpetuation of the practice in order that the estate of a deceased veterinarian (usually the older) may collect outstanding open accounts; provision for the disposal of equipment of a deceased veterinarian; division of work; limitation of liability; and protection against malpractice.

The clauses of the articles of co-partnership appended to this discussion are self-explanatory, particularly that which pertains to protection of the older veterinarian from withdrawal by the younger, with consequent loss to the senior veterinarian of a portion of the practice. It is customary for the senior partner to demand a legal contract wherein the junior partner agrees not to practice within a certain radius in case of dissolution of the contract. In some states such a contractual provision will not hold. In those states wherein it does hold, there are so many technical loopholes, and the ultimate enforcement is so difficult, that this type of protection is impractical. There can be only one compensation—a financial one.

The actual figures in the sample contract are, of course, subject to wide individual variation. This particular contract is based upon a $10,000 net yearly income merely for the sake of convenience.

A sliding scale is agreed upon which will insure a decreasing share of income for the older man. It should be remembered, however, that the older man's income may be on the decline anyhow. Under the stimulus of a younger and fresher enthusiasm, as well as an increased output of professional work, the total income will probably grow, thus compensating in part at least for the decrease in the older partner's share.

As a guarantee that the younger man will not suddenly withdraw and set up a practice nearby, 10% of his net income is set aside in a trust fund. Each year this fund grows and becomes a greater protection. Not only that—this trust fund is also available to the younger man for purchasing his proportionate share of equipment in event of the older man's death. This is illustrated in the accompanying table, which indicates the disposition of the partnership's net income.

This table supposes the income to remain the same. Actually, there should be a substantial increase which would help maintain the older doctor's income. This will also increase more rapidly the younger

doctor's income, dependent to quite a degree, of course, on his own efforts. The trust fund grows yearly as his potential ability to take away the older man's practice grows. It makes him more and more reluctant to disassociate himself from the older veterinarian and thus lose a valuable investment. If he should break away, the older partner has a definite financial remuneration for such loss of practice as he may suffer.

Assuming that both parties are of unimpeachable integrity, *what results will be obtained from a senior-junior contract?* The senior partner immediately experiences a freedom that he has seldom known since he began the practice of veterinary medicine. He is at liberty to enjoy leisure, renew old friendships, take vacations and otherwise slow down without relinquishing his hold on the practice he has worked so hard to accumulate. As time goes on, more and more responsibility is rested in the junior partner, and the senior partner begins to assume the role of consultant. At the same time, a steady income is maintained for the older man, perhaps even an increasing income. The partnership prevents his practice from slipping away in many directions and at an accelerating pace. Moreover, his family will be able to collect a sizeable number of these accounts after his death.

The following articles of co-partnership are offered as an example for possible adaptation to the specific needs of a particular situation.

THIS CONTRACT is made and entered into on the ..... day of ....., 19..... by and between Dr. ....., hereinafter known as the Senior Partner, and Dr. ....., hereinafter known as the Junior Partner.

WITNESSETH: Both of said parties have agreed, and by these presents do agree, to associate themselves for a period of years from the date hereof as co-partners in the profession and practice of veterinary medicine in all its branches under the firm name of ..... and, during such a period, to devote their entire time severally to the professional business of said firm to the best of their ability and skill and for the mutual advantages and benefits thereof.

First: The said co-partnership is to continue for the period specified herein from the date hereof and is to exist during that time. It may be terminated upon the expressed desire of either party in writing or notice within sixty days of the termination thereof.

Second: In case of death of either party, this contract becomes wholly binding and the clauses herein incontestable.

Third: Senior Partner shall be vested with the administration of the practice and hospital, shall be in possession of and in control of the joint practice of both partners and shall administer, direct, charge, audit and collect fees therefor.

Division of Partnership's Net Income

	Senior income		Junior income		Trust fund	
1st year	75%	$7,500	25%	$2,500	10%	$250
2nd year	70%	7,000	30%	3,000	10%	300
3rd year	65%	6,500	35%	3,500	10%	350
4th year	60%	6,000	40%	4,000	10%	400
5th year*	55%	5,500	45%	4,500	10%	450

*After the fifth year, the proportionate share will remain 55% to the senior partner over such a period as decided in each individual instance.

Fourth: All income for the joint practice shall be banked by the Senior Partner, and after expenses of practice paid, the net profits shall be shared as follows: First fiscal year, Senior Partner 75%, Junior Partner 25%; second fiscal year, Senior Partner 70%, Junior Partner 30%; third fiscal year, Senior Partner 65%, Junior Partner 35%; fourth fiscal year, Senior Partner 60%, Junior Partner 40%. Thereafter the proportionate share of the net proceeds from the joint practice shall be Senior Partner 55%, and Junior Partner 45% until the dissolution of the co-partnership or upon the death of one partner.

Fifth: The Senior Partner shall deduct and place in a savings trust fund in the name of the joint co-partnership ten percent (10%) of the Junior Partner's proportionate share of the net proceeds at the current rate of interest.

Sixth: This monthly deduction recited in the fifth article shall continue each fiscal year until the dissolution of the co-partnership or the death of one of the partners, and shall be banked in the prescribed manner.

Seventh: Upon the death of either party, these accumulated funds shall become the property of the surviving partner. Upon retirement or death of the Senior Partner, or upon dissolution of this co-partnership at the time stated above, these accumulated funds shall become the property of the Junior Partner. Upon the termination of this contract before the time stated above, upon written petition of either or both parties, these accumulated funds shall become the property of the Senior Partner.

Eighth: Each partner is to devote his entire time and attention to the joint practice and to engage in no other business enterprise without the written consent of the other.

Ninth: It is expressly stipulated that the Junior Partner will help in all cases when needed, and will perform those duties assigned to him at the discretion of the Senior Partner.

Tenth: Either party shall assume the entire joint practice in the absence of the other partner on account of sickness, vacation or other reason.

Eleventh: The Senior Partner shall have one month's vacation a year and the Junior Partner two weeks' vacation each year, both in addition to attendance at medical meetings. These vacations shall be at the discretion of the Senior Partner.

Twelfth: Neither is to become surety or bondsman for anyone without the written consent of the other.

Thirteenth: In case of the death of either party, a list of outstanding accounts shall be submitted to the deceased partner's family, and the surviving partner shall be honor-bound and legally obligated to attempt to collect and return to the family of the deceased the proportionate share of such outstanding accounts as determined by the fiscal year and the month in which the death of the deceased partner occurred.

Fourteenth: In case of the death of either party, the proportionate share of the hospital property and equipment shall become the purchasable property of the surviving partner, and family of the deceased shall be paid the full amount of the deceased partner's share thereof from the accumulated trust fund as recited in Article Five herein.

Fifteenth: It is expressly stipulated that each partner will be liable only for the acts, indebtedness and liabilities of the other partner as occur in the actual pursuance of the joint practice of veterinary medicine, and that to his proportionate share in the partnership that exists at the time of the commission thereof.

Sixteenth: An A.V.M.A. insurance policy against malpractice, issued in the name of the co-partnership, shall be maintained and paid from the funds accruing from the joint practice and this expense shall be considered general office expense of the practice.

IN WITNESS WHEREOF, the parties aforesaid have hereunto set their hands and affixed their seals on the day and year above written.

.....
Senior Partner

.....
Junior Partner

newsletter

V. M. publisher C. M. Cooper offers a positive approach to the problems facing the veterinary practitioner

Is the veterinary profession sick? This inquiry has been heard with increasing frequency in convention hall discussions. What these veterinarians probably mean is "I'm discouraged and my practice is not looking too strong. Is everybody having trouble?"

No one can take issue with the fact that the nature of veterinary service is changing rapidly. For those who do nothing but worry, this may well be a disastrous shift. But those who have accepted the situation and are doing their best to adjust their activities accordingly appear confident.

The increasing importance of disease prevention is a logical development. The big question is how can the established practitioner fit into this picture? How can he make a fair professional income for such services and how does he develop such a practice within the boundaries of professional propriety?

The first important step is to want to make a change. With a positive approach to the problem, it becomes a planning job. To determine if you would be interested in this type of work, let's assume that you could devote 50 hours of your time a week or 2,400 hours a year, to this type of work. To obtain a basic income from these services of $15,000 a year, you must charge $6.50 an hour. All operating expenses for the year would bring this figure to approximately $14.00 an hour.

The problem is where can you find a demand for 2,400 hours of professional time at $14.00 an hour? For planning purposes let's set an objective of 25 clients. You could then spend two hours each week with each client.

What must you supply clients for $14.00 an hour? Organization and know-how sum it up in a nutshell. If you tackle such programs you must study the client's operation until you understand it much better than he does. A well planned set of records maintained by you (not the client) offers a key to success.

With all records kept in your office, the two-hour session will need to take place in the privacy of your office once a month for planning purposes. In support of this type of service you will be expected to work from a suitable clinic facility with veterinary surgery, diagnostic and emergency services available.

How do you get 25 clients interested in this type of service? Why not try inviting a group of potential clients you think could use such service to a series of educational meetings at the veterinary clinic. Extension veterinarians and college specialists will help you provide a good program. If you get 25 interested farmers you are ready to go. If not, invite another group for the next session.

Drugs and supplies have been deliberately avoided in this planning. They can be a valuable added service but should not be confused with the professional service program.

Like farm operations, veterinary practice appears to be headed toward bigger and bigger operations. Those willing to invest in the profession appear to be doing well. This trend accentuates the advantages of several veterinarians operating from a single facility. If you are not interested in the management type of service, why not consider association with other veterinarians that want to do this type of work. They can't carry on regular veterinary services and will desperately need the support of good surgeons and clinicians to make their programs work. Group practice appears destined for greater popularity.

July 25th News Digest Cartoon Contest

PRIZE WINNING CAPTION

Dr. H. A. Servais, Tarboro, N. C. was awarded a $10.00 prize for the caption used on the right.

HONORABLE MENTION

"That's my last balling gun, too."
Dr. K. C. Roberts, Purcellville, Va.

"Tracheitis!!"
Dr. J. E. Oliver, Houston, Texas.

"Uh-huh- Third degree burns with a rocket-fuel odor."

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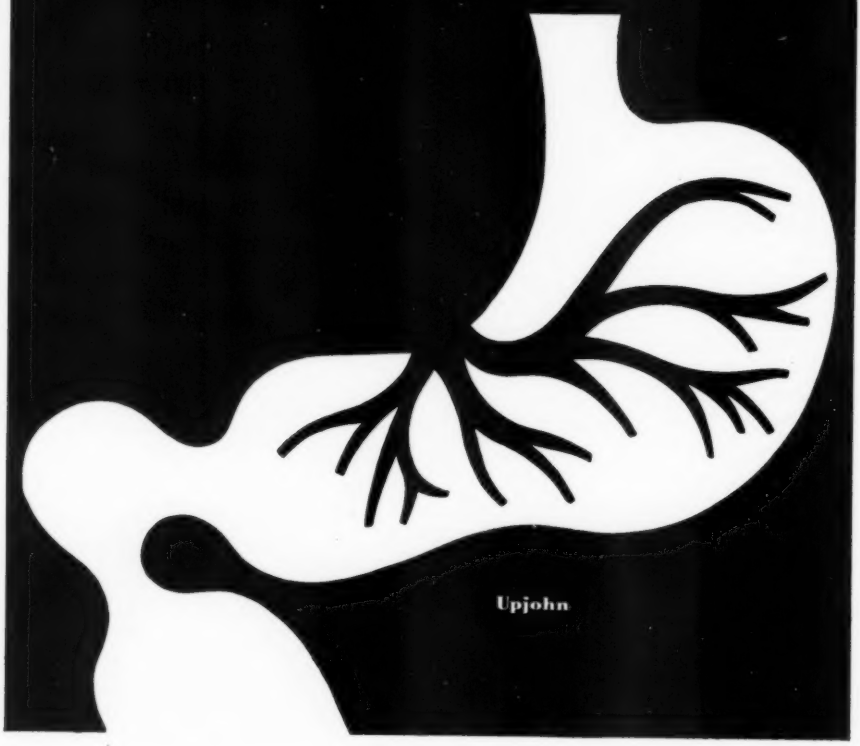

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